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JOHN F. DASHIELL, *Editor*

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CASE LANUTI: EXTREME CONCRETIZATION OF BEHAVIOR DUE TO DAMAGE OF THE BRAIN CORTEX*

I. Introduction

Research in psychopathology during recent decades has confirmed Hughling Jackson's (28) hypothesis that mental disorder caused by damage to the brain cortex is not a conglomeration of unrelated defects, but an expression of systematic disintegration. The changes in behavior produced by the destruction of the cortex (through injury, disease, or toxic processes) can be best understood as de-differentiation from more complex processes to simpler ones. Consequently the study of patients with brain pathology is not merely of medical interest, but presents problems of far-reaching psychological significance. Some of the most important ones are these: How does de-differentiation change the personality structure of the patient? How is this de-differentiated personality different from the undifferentiated personality of the child? How does the pathological disintegration affect the person's relations to other people? To what kind of environment can such a person adjust and how does the process of adjustment take place? How are the different psychological functions affected by de-differentiation? What can we learn from the study of these altered forms of perception, memory, thinking, emotion, etc., about the normal structure of these processes?

We can hope to obtain answers to such questions only from intensive studies of single cases of brain pathology. Questions pertaining to the organization of the whole personality require close study of all aspects of behavior and their interrelationship; they cannot be answered by means of a fragmentary description of a number of superficially observed cases. We owe both the confirmation of Jackson's hypothesis and a better understanding of the structural changes in performance and personality produced by cortical pathology to intensive investigation of individual cases. The number of such studies, however, is relatively small; the case records are rarely reported in sufficient details to warrant definite conclusions. There are two main reasons for this scarcity: first, the difficulty of making the necessary careful and extended examinations; second, the fact that not every case of cortical damage is suitable for such examination and analysis. The investigation of every case that offers favorable conditions for complete experimental analysis is therefore of great theoretical value.

The case here presented is that of deterioration subsequent to brain injury. It was studied by means of observation and of numerous special experiments and tests, and has been followed up for a period of nine years. This case not only lent itself to an intensive investigation of this kind, but proved particularly valuable by virtue of the following outstanding features. The characteristic signs of de-differentiation were found in extreme intensity in practically all fields of performance. In addition, the patient had an unusual expressive endowment. His facial expression, intonation and actions frequently gave one immediate insight into psychological processes which such patients, due to their defect, cannot communicate by ordinary means. These features bring into strikingly sharp focus phenomena which in other similar cases can be revealed only with great difficulty, and make the patient an unusually informative example of extreme de-differentiation.

* From the Research Service of the Worcester State Hospital. The name of the patient, Lanuti, is fictitious.

II. Initial Picture of the Patient

Case History. F. Lanuti born in Italy in 1892 (?), came to the United States in 1912, grocer. Probably of a low educational level, always spoke very poor English; very industrious and good-natured. In 1928, as a result of an automobile accident, temporary loss of sensation in the face and paralysis of the left lower face, the muscular weakness remaining permanent. In December 1932, while carrying a bag of flour, fell down a flight of stairs. Following this he complained of headache and of pain in the middle of his back and gradually developed peculiarities of behavior. He was irritable, talked to himself, at times appeared hallucinated, and was finally committed to the Worcester State Hospital in July 1933. The most conspicuous symptom at that time consisted of an incessant rhythmic repetition of one stereotyped sentence, depressive in content: "Somebody kill me, me kill somebody else, me die, me die." The routine neurological examination revealed no abnormalities except a considerable concentric (non-tubular) constriction of visual fields. Visual acuity could not be tested with the usual methods, but all evidence indicated that vision was not essentially impaired. The patient remained in the hospital, was employed in farm work and showed no marked improvement over a period of nine years.

The psychological study of the patient was begun in October 1933, ten months after the accident. He was studied very intensively for one year, and was seen at less frequent intervals during the second year of the study. At the time of the beginning of the study Lanuti could be seen on the ward sitting by himself or walking around aimlessly, staring in front of him with a puzzled sad expression. He seemed to pay no attention to his environment. He never initiated contacts with other patients, although he went along with them, as if automatically, to meals and to work. With a perplexed look he obeyed ordinary commands of the ward personnel. Attempts at a psychiatric interview usually failed. Although Lanuti seemed to listen to questions, his reaction even to the simplest of them was often very peculiar: he either replied in a most inadequate and even phantastic way, or remained silent gazing at the examiner in bewilderment and occasionally showed signs of excitement and fear. This general state of the patient, characterized by inaccessibility and by lack of response appropriate to the situation, might be best described as a state of psychological 'freezing.'

This type of behavior was, however, not the only one displayed by the patient. Even during the interviews he would occasionally respond to questions readily and more or less adequately, giving a vivid account of his experiences. In the laboratory he applied himself with eagerness and effort to most of the tasks which he was given, and showed great concern about his performance. Even more striking was the occasional occurrence of an immediate and adequate emotional response to some situations involving a social element, a response which often exceeded the average normal one by its promptitude, vivacity and strength. Yet even when the patient was animated, attentive, and alert, he never solved a single task in a normal way. One could only speak of varying degrees of failure. The investigation revealed defects of such intensity that in their light even the most trivial accomplishments of the patient, such as his ability to conform to the hospital routine, appeared astonishing.

In the following sections the patient's performance in various fields of activity will be described. We shall discuss 1)

Recognition of the environment; 2) Spatial organization; 3) Use of symbols; 4) Memory; 5) Experience of values; 6) Reality and phantasy. At the end of each chapter its content is briefly summarized. The last chapter discusses the changes that took place in the patient's performance and behavior during the nine years of hospitalization.[1]

[1] The authors wish to express their gratitude to Dr. D. Shakow and Dr. A. Angyal, who read the manuscript and made many valuable suggestions.

III. Recognition of the Environment

1. Recognition of Objects

The patient's difficulty in recognizing objects was not especially conspicuous in his behavior on the ward, but it became at once obvious when, in the laboratory setting, he was asked to name objects or pictures shown to him. We shall first describe the recognition of objects in pictures and then the recognition of real objects.

Lanuti is presented with large photographs of common objects, two or three in one picture. He examines each picture very carefully, turning it or turning his head so as to see it from different angles and occasionally looks at it from varying distances.[2] Once in a while he puts his finger on the object under consideration, or traces its contour, or moves the finger over the paper as if to palpate the object. The interpretation finally produced is characterized by strong personal reference, frequently by reference to specific objects in the patient's environment, and—most conspicuously—by a very strong pantomimic action accompanying it. This action usually occurs *after* the name has been given. The following examples demonstrate these peculiarities of the identification of pictured objects.

A pair of shoes and stockings. After twenty seconds of examination Lanuti says nodding his head with great approval: "Yes, yes! Yes! . . . Shoes!" Then he adds thoughtfully, looking at the stockings: "Gee, good stuff!" To the examiner's question: "What is it?" he answers by pointing to his own socks: "These! Stockings. . . . Mine are broken—whose are these?" and makes a motion as if to take the stocking from the picture.

A bicycle. "Train. . . . You see: bell dong! Me go away to Boston—express!" Lanuti makes a sweeping gesture with his arm indicating the motion of the train.

A cup of milk and a piece of bread on a plate. Lanuti pulls the book closer, then picks it up and examines the picture very attentively for twenty-five seconds, frowning as he does so. Says pointing to the cup: "This bag, small bag," and makes a motion of grasping the cup in the picture by the handle and of lifting it. To the examiner's question: "What else?"—he answers first in an interrogative tone: "Chew tobacco?" Then he repeats it with more assurance and makes the motion of picking up the piece of bread in the picture and carrying it to his mouth.

These examples show that recognition of pictured objects is no longer an immediate simple automatized process for the patient, but a laborious task often consisting of several steps. The total shape, the various parts, the color may become effective in turns, until one of these aspects gains dominance and becomes the clue to the meaning of the object. The resulting interpretation is more often false than correct, but its relation to some aspect of the presented picture is always discernible. The interpretation is given with varying degrees of conviction, but hardly ever with complete certainty.[3] The pantomime that follows it has the character of an unpremeditated natural outflow of the activated situation: one gets the im-

[2] One of the functions of these manoeuvres is probably that of compensating for the possibly reduced visual acuity and the constriction of visual fields. Since in the basic experiments ample time was given for such adjustments, failures to identify the object cannot be ascribed to the purely visual defects.

[3] Once, having gone through a whole book of pictures and approved of it as "good, nice!" Lanuti said in a sad tone: "head no good." At other times the dissatisfaction with his interpretation is projected onto the picture which is dismissed as "no good picture." The lack of certainty is obvious in both cases.

pression that for the patient an object has meaning only as part of the situation in which it appears, and that to experience a situation is to act it out.

Faced with real objects (presented one at a time, on a piece of cardboard), Lanuti immediately initiates a real action with the object. Quite impulsively he takes hold of the thing presented and tries to do something with it, to bring it into functioning in one way or another. If the object 'responds' to one of these actions by functioning more or less adequately, it is recognized by the patient and named accordingly.[4] Action here does not merely follow the naming, as in the case of pictures, but precedes and determines it: Lanuti makes the object, as it were, reveal its nature through operation. The following examples demonstrate his procedure:

Egg. Lanuti takes the egg, turns it, knocks it lightly on the table, shakes it in front of his ear, then makes a motion to throw it saying: "Ball. . . . Want play?" The examiner cracks the egg and returns it to Lanuti who now immediately starts shelling the egg very carefully and says, as if making a discovery: "Egg!"

Ball. Lanuti takes it, squeezes, bites into it and shakes his head with disapproval. Throws the ball on the floor and when it rebounds, exclaims joyfully: "Ball!"

Pipe (clay pipe covered with black paint which rubbed off easily). Lanuti gets hold of it, turns it in his hands, and then moves its thin end on the paper as if scribbling. The paint leaves black marks on the paper. Patient says in an uncertain questioning tone of voice: "Pence? . . . Black pence?" (his word for pencil).

The situation appears paradoxical: the patient does not seem to recognize the object until he actually sees it in action, and yet he himself initiates this action at least partially appropriate to the given object. Why does he start writing with the pencil if he does not already know that this *is* a pencil? Yet, as the examples show, the specific action is often only one among many that are tried out. To be sure, Lanuti does not apply each activity to each object, e.g., he does not throw scissors or roll books, but the limitations are usually imposed by some aspects of the objects, apart from their specific object-meaning. Objects are squeezed, thrown, brought in contact with other objects because they seem to lend themselves to such treatment, actually in accordance with their shape, size or consistency. Even when the action suggested by the object would seem to be very specific, such as scribbling with the pencil, the behavior of the patient shows that only during the successful action itself is the object actually 'constituted.' The characteristics of the object first determine the field of action and the action that follows in its turn specifies the object. Even if in the immediately preceding experiment Lanuti had experienced a given object functioning in a certain way, he very seldom fails to try the same object again, and if it does not function as previously the original interpretation is dropped.

When a box of matches is opened for the patient, he takes out a match and repeatedly strikes it on the box, but when the match finally lights, he stares at it first in complete amazement and only then says as if he were making a discovery: "Match this!" and asks for permission to keep the box. In repeating the experiment after a few minutes Lanuti happens to strike the match on the wrong surface. He says with a puzzled and bewildered expression: "No more. . . . No good this. . . . No start this . . . no match. . . . This stick, and no match."

If an object cannot be operated and

[4] Similar behavior has been observed in other cases of agnosia and aphasia by Goldstein and Katz (17).

recognized by its function, the 'recognition' may take place fundamentally in the same way as with pictures, with the only difference that the data of different senses are utilized in the inspection of the object. This mode of recognition, however, is decidedly less satisfactory for Lanuti. Being prevented from acting and from trying out the object is for him a very annoying and unnatural state of affairs. When he is asked to name the object while keeping his hands in his pockets, he repeatedly breaks the prohibition and impulsively grasps the objects or asks entreatingly: "Me first try." He expresses dislike for the whole situation, and when finally allowed to use his hands, says with great relief: "This better." The patient wants to handle objects not because it is easier for him to recognize them by touch than by sight; when he is permitted to use touch only, his identifications of objects are even more faulty, and he is as insistent in his demands "me see" when he is debarred from looking, as he is in his demands "me touch," when asked to keep his hands behind his back. When Lanuti is left free to investigate the object as he wishes, he does not seem to give preference to any one sensory field, but uses the different clues interchangeably, including hearing, taste and smell.[5] The more kinds of clues available, the higher the chance for the patient to strike one than can lead to a correct interpretation. He may take a knife for a spoon when merely looking at it, but recognizes it correctly when, being allowed to touch it, he feels the edge with his finger; similarly a lemon is called "carrots" after the visual inspection, but recognized as a lemon after the patient bites into it. On the other hand, a box of matches when examined by touch only, gives rise to the interpretation "paper," while visual inspection leads to a more adequate interpretation "box." For different objects different sensory fields yield the best clues for recognition. *The fundamental point seems to be not how the object feels, sounds, looks, but how it functions.* In some cases when the patient, being forbidden to handle the object, was unable to give any interpretation or gave a false one, the demonstration of the appropriate action with the object by the examiner led to the correct designation. Lanuti soon learned to ask the examiner to try the object out for him.

The handling of the objects not only facilitates recognition by providing a larger number of clues: the quality of recognition itself is changed when real outward action can be carried out. This action alone forms the basis for the experiences of truth or falsity of the interpretation (or rather the primitive functional analogues of such experiences of normal subjects). These experiences arise only when the object itself, on being brought into operation, fulfills or fails to fulfill the situation which has been aroused in the patient. What in the case of a picture must remain supposition, in the case of a functioning object can become a certainty, a reality, for the patient.

Of the two experiences—of falsity and of correctness—the first is the more conspicuous one. It occurs—and can be *ad libitum* produced by the examiner—when the patient, after having given a false interpretation, is allowed to ma-

[5] Isolated recognition of objects by the sound when manipulated and of different substances by their smell proved extremely uncertain and faulty. In some of these experiments a phenomenon appeared which has been reported by other investigators. An object would be named wrongly when presented to the subject, but its correct name would be occasionally given later in application to some other object.

nipulate the object and finds that it functions in a way different from the one in which he tries to make it function.

In the experiments in which Lanuti was prevented from touching the objects, he repeatedly designated a dark stone as "chocolate" and a lemon as "carrot," first in a very uncertain tone of voice, later with growing assurance. After the prohibition is removed, he is again asked to name the stone. He grasps it and puts it in his mouth, frowns, takes it out, knocks it against the table and says in a very excited tone: "What the hell! Not chocolate—stone! Can't eat—me talk chocolate: tst, tst! . . . Who give it you? Me talk chocolate—me first taste, try. . . ."

He is then asked to name the lemon. He takes it, turns it in his hands, then bites into it and says, greatly astonished: "This lemon—smell! No carrots this . . . smell—this is good!" He then slaps his head in anger: "Me talk carrots—me crazy like that! . . . This a lemon—lemon—it is good. . . . Me talk carrots—me crazy, me no good."

The experience of correctness can be observed when the object, on being put into operation, suddenly 'responds,' functions in an immediately plausible way, as when a match lights, or a pencil leaves marks on paper. At such times the habitually puzzled and troubled countenance of Lanuti suddenly brightens up, an expression of awe comes into his eyes, and he says the name of the object in a hushed voice, as if overcome by a sudden revelation. This sudden contact with reality is apparently an exceptional and gratifying experience for the patient. In comparison with these moments of clarity and immediate certainty all the rest of the patient's 'recognition' of objects or pictures appears as mere guessing of varying degrees of uncertainty. The 'immediate certainty,' however, must be thought of as a very primitive experience. It is neither conviction nor belief based on definite criteria, but rather a 'clicking,' an immediate experiencing of things being right, of their almost perceptual adequacy and harmony. The possibility of this kind of contact with reality is very important for the understanding of the total structure and development of the patient's condition. We shall refer to the experiences of this type as the experiences of *complete fulfilment.*

The instances of fulfilment experience in object-naming coincide to a large extent with cases of *correct* interpretation. Exceptions, i.e., the instances when a faulty interpretation is accompanied by a fulfilment experience, may occur, since objects may sometimes function adequately, even if they are not designed for the given purpose. In view of this possibility the actually observed high degree of coincidence of fulfilment experience with correct interpretation becomes in itself a problem. "Writing" with a pipe that leaves black marks and writing with a pencil should both result in fulfilment experience. This, however, is not the case, the interpretation of pipe as pencil being given in a highly hesitant way. From a number of such instances we must conclude that the actual functioning, although doubtless the central factor, is not the only one in creating the fulfilment experience. We must assume that the aspects of objects that apparently play no part in the final interpretation are still in some form present in the background and may become effective. That explains why the patient while calling an egg a "ball" and making a motion of throwing it, actually does *not* throw it: its characteristics of being breakable (the testing of which is indicated by his first action of knocking it lightly on the table), is present in some form and keeps the patient from following through. We may assume that the presence in the background of such divergent tendencies to action is responsible for the hesitancy and lack of conviction characteristic of many of the false responses. On the other hand, the absence of such secondary tendencies divergent from the predominant aspect is probably what gives the correct interpretation its outstanding character, and, along with the functioning, accounts for the 'clicking' which

seems to be the essence of the fulfilment experience.

Correctness or falsity of the patient's 'recognition' of objects depends ultimately on whether he happens to strike an important or a relatively unimportant clue. But what is it that makes one aspect of the object or of the picture win the contest? What is it that determines the choice of one of all possible interpretations? We may hope to obtain some idea at least about the direction in which the answer lies by analyzing the cases in which the same picture or the same object gave rise to different interpretations, especially the cases in which one of these interpretations was correct.

Lanuti does not recognize a key presented on a cardboard, calling it a scrap of iron, but recognizes it at once correctly when the examiner puts it in the key hole of a door. Milk in a closed bottle is hesitantly called "paint" and not touched; when it is presented in an open bottle, Lanuti seizes and drinks it immediately and names it correctly. A closed box of matches is recognized merely as a box (or as candy) but when a match is produced from the box the latter is sometimes named correctly. A book was first interpreted as "bag put money in—pocketbook" because Lanuti discovered that things could be put between the pages; a few seconds later, while wanting to try out a pencil, he opened this same book which remained on the table and prepared to write in it. This transition to a different usage within a changed situation was so natural that the two examiners did not at the time become aware of the inconsistency and discovered it only in examining the protocol. In the same way, in a picture representing a place laid for dinner the plate was interpreted as a wheel, but was 'used' correctly during the pantomime carried out to show the use of the *spoon* pictured at its side.

In these instances the isolated presentation of an object makes the interpretation very difficult and uncertain, while a presentation within a setting which suggests and permits a definite usage of the object facilitates and determines recognition. We may further assume that situations familiar, and of personal importance, for the patient are more likely to arise than others. The sphere of Catholic religion, e.g., is of high significance for the patient, and many of his interpretations of objects and pictures are determined by it. Thus a book, which usually is interpreted as a pocketbook, may suddenly, under the same conditions of presentation, be seen as a Bible ("priest use"). From the patient's total behavior, his holding the book at arm's length, mumbling to himself, walking slowly to the blackboard and trying to place it there, we can infer that the concrete situation of the Catholic service has been activated in the patient; the book is seen as a Bible because it is experienced as a part of this situation.

The effect of a natural setting that permitted action was sometimes manifested in a striking way. Lanuti among his other peculiarities was unable to understand the function of a mirror, by which he was greatly upset. When first confronted with his own image he attempted to talk to it, swore at it for its failure to respond, suspected the working of the devil in it, and frantically searched behind the mirror and behind the wall for the mysterious apparition. While he was in this state of excitement and bewilderment one of the observers put a comb in his hand and asked him about its function. The patient immediately started to comb his hair, and in doing so turned to the mirror and used it adequately in a matter-of-fact way which strikingly contrasted with his tempestuous reaction of a moment ago.

In the second instance, the unusual reaction was aroused by a moth. A moth, of course, was not a novel experience for Lanuti. The observers had a chance to see him during a walk on the grounds chasing butterflies with the greatest eagerness. Yet when a

large colored moth came out of a cocoon stored in the laboratory by some other patient, and Lanuti perceived it sitting on the desk, his reaction was that of a complete panic. He rushed out of the room and refused to re-enter it, imitating with his arms the slow motion of the moth's wings, and replying to all persuasion with great conviction: "No, diavolo there—make like that!" The sight of a living moth in the office appeared unusual even to normal persons. To the patient the moth in this setting was not only unrecognizable but, because of its incongruity, strange and uncanny.

Some of the examples of the last paragraph show that the appropriate setting brings about more readily the correct usage of the object than its correct naming. When attempting to identify the pencil Lanuti incidentally uses the book to write in, and when interpreting the picture of the spoon he makes the plate a reference point of the scooping-up motions; at the very next moment, when he is asked to *name* the plate, the previous action-situation seems to disappear and the now isolated plate is seen as a wheel. It seems as if the set to name an object had the effect of immediately isolating it from its environment by dissolving an existing functional connectedness. These observations bring out the difference between handling or using the object in the context of some natural practical activity and concentrating on it with the 'theoretical' purpose of recognizing or identifying it. On the first, practical level, the patient functions; in pursuing his daily routine he, on the whole, uses the simple objects of his environment correctly. That is the reason why his defect does not become conspicuous in his ward-behavior. But at the moment when, prompted by the examiner, or on rare occasions spontaneously, he attempts to determine the nature or name of the object as such, the set for practical use disappears, and the object which was previously used correctly becomes a highly problematic item.

It would be wrong, however, to say that the patient *recognizes the objects* in a practical situation and does not recognize them when set for this task. It is doubtful whether in his case we may speak of recognition of objects at all, because under all circumstances things seem to be for him only parts of a situation which he can master by action, never recognized in their relative independence and stability. Yet, an attempt at recognition and naming points to a higher level of behavior than the mere functioning within a practical situation, even though this attempt ends in failure, and the higher level is never reached. Only such attempts give the possibility of a definite achievement, which differs from the mere functioning inasmuch as it is a segregated act that may be appreciated as correct or false and may lead to the experience of success or failure. And actually it is within the setting of the psychological experiment confronting the patient with definite isolated tasks, that we find him attentive, persistent, determined by the task until he solves it, and greatly concerned about his success or failure. Only in this setting can the occasional striking functioning of the object give rise to the fulfilment experience, to a sudden lively contact with reality, which seems to have such high value for the patient.

2. RECOGNITION OF PERSONS AND SCENES

The patient's recognition of living beings in pictures was slightly superior to that of inanimate objects. Both animals and persons were in the majority of cases identified as such, particularly

in photographs or reproductions of realistic paintings. Finer differentiations, however, were as poor for living beings as for objects, and the interpretation was as much dependent on single details or aspects of the picture. A cow of a massive appearance might be reported as an "elephant," a cat was called a "dog," a horse—"a cow," hares—"monkeys," and a schematically represented bird was seen as a cat. The sex and age of the persons represented were seldom given correctly. Madonna with the child, for instance, was called: "One man and one boy," and the infant in Van Dyck's picture 'Baby Stuart' was called a priest, apparently because of its stiff ornamental dress.

In striking contrast to this poor appreciation of the features of the face is the good appreciation of the facial expression. Although usually unable to give an adequate verbal description, Lanuti often imitated the represented expression with an astonishing exactitude, greatly rejoicing in those picturing positive emotions and vehemently rejecting as "no good pictures" those picturing anger, disgust, contempt, or fear. This 'recognition' of expression, however, strongly depended on the representation. Whereas the expression pictured in photographs and in good artistic paintings—the natural expression—was seldom misconstrued, the patient sometimes showed a striking inability to 'recognize' the expression as represented by some generally accepted conventional means. Thus, an advertisement which to every normal observer was clearly a picture of a smiling girl, the smile being represented by a rather exaggerated curvature and extension of the mouth, proved a very puzzling object for Lanuti. He said in amazement: "What the hell, she make like that" and broadened his mouth in a grimace which was revealingly similar to the original with its actual lack of expression.

In pictured scenes the action itself is occasionally appreciated correctly, but only when the situation is simple and can be exhaustively represented by the expression, gesture, and position of the persons. If the situation must be understood by its implications, it has no chance to be recognized correctly by the patient. He attempts also in this case to construct some immediate action-situation from the position and expression of the persons involved. Following are the examples of Lanuti's successes and failures in interpreting pictured scenes.

1. A girl playing with a puppy, holding it up, with a big dog at her feet. Lanuti looks at the picture for a long time nodding his head in approval. After seventy-five seconds the examiner asks: "What is it?" "Is small kitty—mother kitty. Lady is . . . (raises his arms imitating the posture of the girl). Big kitty laugh—ha ha! and big lady—like that. Small kitty—miaw! . . . Is good, nice!" He greatly enjoys the represented situation, repeatedly imitates the action of the girl, and soon starts talking to her trying to persuade her to let the puppy go: "Leave, leave on the floor, he go eat"—until the picture is taken away.

2. Blacksmith shoeing a horse. Lanuti says after fifteen seconds: "What the hell, crazy man, no good; cut the leg from the small jackass, no good paper. No good man—fresh man, cut the leg of jackass." Starts howling with a very pathetic expression: "Jackass he do like that, he sing like that."

3. A boy walking past a cemetery at night, frightened. "Oh Jesus—one man, boy fight!" He gets up and imitates the flexed position of the boy's arms, interpreting it as preparatory to striking; points to the tombstones in the picture: "These people—all these people he fight—no good! . . . He mad, what's matter, why you mad, you no fight!"

4. A big boy with a club in his hand ordering a small boy to steal from the peddler.

"Three men." Examiner: "What do they do?" He answers with a puzzled expression—"Play?" and then starts to elaborate on this interpretation: "He plays, see stick—and ball (actually a pail); sure—play, good time, good picture—people all play—pictures all play."[6]

In comparison with the process of identifying objects the action aroused by persons and scenes seems to have a higher degree of intensity and to reach a certain independence from the task of recognition. Lanuti is less eager to identify and name the scene, he is more absorbed in acting it, and it is often necessary for the examiner to interrupt this play which otherwise tends to continue indefinitely.

The recognition of real persons and situations obeys fundamentally the same laws as the recognition of pictures, but is made easier through the addition of speech and real action. However, this recognition can be easily disturbed. When the bobbed hair of a woman whom he had recognized as such, was pointed out to the patient, he quickly reversed his judgment and declared that this was a boy. Identification of individual persons seems to be very difficult for Lanuti. The observers were once obliged to introduce to him his own wife, whom he did not recognize maintaining that his wife was older. The recognition was however effected when the observers asked the wife to take off her tight-fitting black cap and to demonstrate her white hair; here again it was one characteristic clue that determined the identification.

After many months of daily sessions with the observers, the patient had not come to the stage of actually 'being acquainted' with them. This does not mean that no definite patterns of behavior were formed with regard to them, but these patterns seemed to be effective only in the familiar ever-recurring situations. If the observers approached Lanuti on the ward, he would often start following them even before he was urged to do so, definitely taking their appearance as a signal for going to the laboratory "to play." But if they met him occasionally on the grounds and tried to talk to him he seemed bewildered and never gave any sign of recognition. Nor was he ever able to tell who they were, or to remember their names. He was, in short, unable to place a person, to establish his identity independently of the momentary situation.

In spite of this permanent lack of knowledge of persons, the patient's reaction to their expression was always extremely adequate and prompt. This even led to difficulties in experimentation. When Lanuti was in doubt as to the solution of a problem he would watch the examiner's face anxiously and intently and respond immediately even to the slightest involuntary change of expression. He would also react very strongly to the tone of voice—more even than to the actual content of the remarks of the examiner.

Simple social situations involving the patient were correctly responded to when their meaning could be immediately grasped from gesture, facial expression, tone of voice and the actions of the other persons involved. Thus he always reacted promptly and correctly to requests for help or to offers of help, to simple orders given in connection with some obvious action or work, to a friendly greeting or to an offer of a present. This ability to respond correctly to simple social situations proved

[6] Pictures 3 and 4 are taken from L. A. Schwartz, Social-Situation Pictures in the Psychiatric Interview, A. J. of Orthopsychiat., Vol. II, No. 2, April 1932, pp. 124-133. They are drawn clearly but without much expression.

sufficient for ordinary ward intercourse and enabled the patient to pass for a good and willing worker on the farm.

On the other hand, he was completely unable to appreciate the wider and less obvious implications of a given situation, realizing, for instance, neither his own status of a patient nor the meaning of all the test situations to which he was subjected. Moreover, he seemed totally oblivious of all situations which did not involve himself and never paid the slightest attention to the words and actions of the other people present in the room as long as they did not address themselves directly to him.

In comparing the patient's response to real or pictorially represented persons and events with his response to inanimate objects, one finds certain significant differences. The evoking of a situation necessary for 'recognition' occurred much more readily with persons and scenes than with inanimate objects. Insecurity, vacillation, prolonged puzzling, are less conspicuous when persons and scenes are involved: often the situation is entered into immediately and with much vigor. On the other hand, we never find with persons and scenes the typical fulfilment experience which sometimes accompanies recognition of real objects, and distinguishes it from that of pictured objects. Since a pronounced fulfilment experience frequently occurs when the recognition is difficult, one might consider the former a function of the degree of difficulty, and assume that the greater the change from initial confusion to final clarity the stronger is the fulfilment experience. Although such a relationship is very likely to exist, another factor seems to be even more important in accounting for the differences between the recognition of objects and that of persons and scenes.

The value of objects for arousing concrete situations might be different from that of persons for the following reasons. An isolated object has only a potentiality for becoming part of a situation, but does not by itself create this situation. Some external agent has to induce it. A fork and a spoon only become meaningful parts of a situation when somebody starts using them as eating utensils. In general, the meaning of objects depends largely on the action that one undertakes with them. Since the patient himself has to supplement the action, and since in choosing this action he may be pulled in different directions by the different clues, the typical vacillation and uncertainty result. A living being, on the other hand, is in himself a center of activity, is 'self-starting': he can create his own situation by means of action and expression. When such self-evident action-situation is created—be it in reality or through adequate pictorial representation—the patient can enter it and participate in it without having first 'to choose' or 'to make' the situation as he must with objects. This may account for his unusually adequate response to the physiognomic moments and expressive actions. The situation which is the prerequisite of the patient's functioning can be defined as one in which he can participate, and the most natural way of participating is acting. Situations involving persons are action-situations *par excellence,* and therefore they are entered into so easily by the patient.

Yet the same factor which facilitates the adequate reaction to persons and events is probably responsible for the absence of the genuine fulfilment experiences in this sphere. These latter are only possible when there are at least some remnants of the theoretical attitude, e.g., in the form of the intention

to identify objects. Such intention was definitely present in recognition of isolated objects and pictures. Occasionally the naming even appeared as a self-imposed task. Thus, the patient once, after having been asked to name each of six small pictures on the same card, suddenly spontaneously started from the beginning and, with excitement and determination, enumerated most of them in one breath: "man, cow, barn, a cow, a seat—see: good! See: I know!" The naming is intended as an isolated task, it is experienced as achievement (or failure) and, in the rare cases of contact with reality, is crowned by a fulfilment experience. The activity accompanying recognition is subordinated to this task at least to the extent that it stops when the name has been produced or shortly afterwards. Not so with pictures representing strong expressive action. The patient is simply drawn into the sphere of action, he lives in the represented situation, and the last traces of a 'theoretical' attitude seem to disappear. The pantomime does not stop after the verbal description has been produced, neither of them being due to an intention of naming but both representing only an outflow of action—two ways of dramatizing the situation. While the patient acts in this situation he appears to function adequately and displays the greatest vitality and alertness, but at the same time he gives up all attempts to place himself at a distance from the situation and to master it through thinking. For the patient, even more than for a normal person, the moving, acting, appealing human beings are apt to evoke immediate active participation, whereas inanimate things—stable, passive, and isolated—represent better objects for a more 'theoretical' attitude.[7]

3. RECOGNITION OF COLORS

Since colors as such can not be manipulated and used in a specific way, their recognition must be inferred largely from naming. A difficulty arises, therefore, to differentiate between the failure to recognize the color and the failure to evoke the appropriate name. In the case of Lanuti practically all observations with one exception point towards the first alternative. On being asked to name the color of a strip of paper, Lanuti usually puzzles over it for a long while, looking at it from different angles, and occasionally even touches and palpates the paper, or picks it up, and turns it in a vain effort to make it yield more clues. The name is finally given in a rather hesitant way. Only in a few cases the expression of true fulfilment occurs indicating the actual recognition of the color. On the whole, however, the correct naming is the exception rather than the rule.

Some of the errors made consist in relating the name to the brightness rather than to the color value. Light colors (yellow) are repeatedly called white, and dark colors (violet) are consistently called black. When asked to choose white from among a number of colors, Lanuti may give yellow, and when asked for black may give violet.

Black and white have a special position among the other colors, in so far as they are more unitary, less apt to 'fall apart' for the disorganized perception than other colors in which hue,

[7] Cases of brain injury described by Wolpert (47), in which the recognition of pictorially represented situations was more difficult than that of simple objects, do not disprove this statement since the situations in question were not of the simple kind here discussed but had to be understood by inference. On the other hand, many authors have observed that objects shown in motion (e.g., in a film) are recognized better than those in a static state, a finding which corroborates our results. An especially pronounced case is that of Jossmann's (29), whose explanation of the function of movement is similar to our explanation of better 'recognition' of scenes.

brightness and saturation may be distinguished. That is probably why white is always named correctly by the patient, and gives rise to a very marked fulfilment experience, which expresses itself in a look of recognition and in an excited whispering of the name. With black the situation is less clear. Black was repeatedly called "blue," and blue —even though the shade used was far from dark—was often called "black." Since the rest of the time black was named and chosen correctly by the patient, the assumption seems plausible that the similarity of the names—their beginning with the same consonants—led to the error in naming, in spite of the recognition. Aphasic difficulties of this kind occasionally occurred in the speech of the patient.

In recognition of hues complete confusion seems to reign, but on closer inspection one finds certain constant errors. Most persistent is the failure to differentiate between green and blue; only in one experiment, where the green and the blue differed considerably in brightness, did the patient succeed in pointing them out promptly and correctly. Next in frequency is the confusion between orange and yellow; yellow and red are also confused, but less frequently. These two major groups of errors occur both in naming colors and in choosing the colors named, as well as in sorting experiments to be described later.

These errors are comprehensible in so far as the colors in question have certain similarities for the normal observer as well, blue and green being most alike of all primary colors and very different in their effect from the 'warm' colors in the range between red and yellow. It still remains difficult to understand on what basis such distinct impressions as pure yellow and pure red could be confused with each other.[8] Occasionally in sorting experiments orange seems to be the mediating link between them, since the confusion occurs more often when orange is present than when it is absent. Also, in naming experiments, although yellow is in some cases called "red," red is practically always named correctly and with great security. Red and white seem to be the only two colors that are clearly recognized by the patient.

On surveying all responses of the patient to colors one gets the impression that only the following categories are to a certain degree effective in his perception: light colors (white), dark colors (black), 'warm' colors (red), and all 'cold' colors (blue and green).

Since color-blindness could be ruled out and normal color vision was proved by the patient's ability to match identical colors correctly, his errors must be due to a failure to apply categories to the chromatic impressions. For a normal person, when he is set for the task of recognition of colors as such, a definite color is determined by its position within the system of colors with its dimensions of hue, brightness, and saturation which serve as categories for the perception. The loss of this 'categorial attitude' towards colors has been shown by Gelb and Goldstein (7) to be the cause of the so-called amnesia for color names. The disturbance observed in our patient is probably akin to that of amnestic patients. He shows, e.g., the transition from

[8] Poetzl (34) makes an attempt to explain this phenomenon, which he observed in some of his patients, by the influence of the peripheral vision in which red appears yellow. The patient's error would then be based on the difficulty to choose between the impressions provided by the peripheral and those provided by the central vision. This is, however, a hypothesis that is difficult to verify.

hue to brightness which is frequent in the amnestic group. One might also assume that the same inability to weigh similarities and dissimilarities which in amnestic cases led to limitation of the name to one individual nuance, possibly led in his case to alternating predominance of one or another color component. As a result any color between yellow and red would be seen now as red and now as yellow. Since the investigation of the patient's behavior towards colors could not be carried far enough, many points remained obscure, and the differences and similarities between the two kinds of cases cannot be stated in exact terms.

We have seen that the patient recognized objects only as parts of a definite concrete situation. An attempt was made to provide the same setting for colors. Lanuti was shown a color and asked to name some object having this color. The actual naming of the colors was not called for. This plan, however, was thwarted to a great extent by Lanuti's inability to understand the task—an inability to which we shall return in the chapter on the understanding of spoken communication. When the examiner gave him an example of solution, he became engrossed in its content and paid no consideration to the matter of color. It was obviously impossible for him to abstract the color of the paper strip and to use it intentionally as a basis for constructing some indefinite object. If the task was so modified, however, that the patient was shown irregular spots of different colors (colored cards of the Rorschach test) and asked what they were, a response was easily obtainable, since no intentional abstraction of one definite characteristic (color) was required here. The content of the interpretations gave evidence of the patient's strong reaction to color, but little proof of the specific (correct) appreciation of single colors, most of the colored spots being interpreted quite generally as flowers.

In another attempt to make colors concrete for the patient he was presented with a few colors and asked to choose the color which matched that of the object named by the examiner. In response to requests such as: "Show me the color of grass," etc., the patient pointed to one of the colors presented but without any certainty. His choices were hardly ever correct, green being given for sky, yellow for trees and also, instead of white, for the uniforms of the attendants. It was felt that the patient was not actually placed *into* the situation by the mere mention of the object which remained abstract and foreign to him, and we tried to make the situation more vivid for him, before raising the question of color. In two instances this attempt proved successful. Lanuti entered most vividly into the situation of a "snow storm": with his arms he showed the movement of the falling snow, produced sounds in imitation of the blowing and howling of the wind and rushed around as if swept along by the storm. At this moment the examiner showed him a piece of cardboard with many small paper strips of different colors, and urged him to "make a picture of snow." He immediately followed this suggestion, and in so doing put together only the white strips which he carefully picked out from among others. In another instance, however, when the examiner introduced the game of selling coal, using paper strips to represent pieces of coal, Lanuti while entering the game with great zest, picked up and used *all* the strips regardless of color. It is likely that, whereas in the case of the snow storm the impression

of white was actually a strong integral part of the total situation evoked, in the selling situation the interest centered on the action of transferring the strips into the box (the "coal truck"), and the color did not become prominent.

The patient's reaction to colors can be understood from the fact that they have neither an action of their own as do persons, nor any specific use by which they could be identified as is the case with objects; within any given situation they are usually more or less irrelevant for that part of it which centers around action. Therefore, since colors cannot be appreciated as part of a situation, the 'theoretical' categorial recognition, closely connected in this case with naming, is the only way that remains open. And actually, we find Lanuti displaying the 'theoretical' intention to identify and name the presented colors with the concomitant attempt at achievement and the occasional occurrence of the fulfilment experience. But since the way of recognition under a category is actually closed to the patient, the results of these attempts are very poor, and only the most outstanding color impressions—white, black, red—still succeed in producing recognition and correct naming.

4. MATCHING AND SORTING

Recognition of objects can be studied also in the task of ordering or sorting. It has been shown by Gelb and Goldstein (7), and Weigl (43), that a normal adult usually will solve this task by choosing the categories appropriate to the material and by applying them consistently. Our patient, as many other patients described in the literature (10, 20, 36, 37, 39), shows conspicuous deviations from this procedure.

In the first place all attempts to make the patient organize material presenting a multitude of qualities, such as Holmgren wools varying in hue, brightness and saturation, proved a complete failure. In spite of all explanations of the nature of the task he would simply distribute the items in space at random, or in some definite geometrical pattern. Even in the simplified task of sorting wooden blocks all of the same size and shape and of two to five different colors, Lanuti's procedure in placing the blocks in different receptacles was largely a random one, and he was never able to make more than two groups. Only with the examiner's help was the correct ordering ever achieved, but even then actual insight and acceptance of the result were missing. The following record is typical in this respect.

Lanuti is asked to "fix" a heap of red and yellow pegs, putting each kind in a separate cup. He looks puzzled and puts pegs of both colors into one cup maintaining that they are "just alike." When the examiner herself starts sorting, he looks on very intently and seems bewildered and upset. Asked to help her, he does so reluctantly, makes mistakes at first, but finally does it correctly. Yet when all red pegs are separated from the yellow ones, he does not agree with the examiner that they are "fixed good now" and remains silent. Asked to order them once more, he looks at the examiner darkly and declares excitedly and almost threateningly: "You fix them better!" This outbreak of anger—a rare occurrence with the patient—probably indicates his feeling of failure in the face of a task which required application of categories.

Because of this inability of the patient to order a multitude of objects, the task of matching was substituted for sorting proper. He was shown or given one object at a time and asked to find its match among a few objects simultaneously presented. It proved that success in this task depended on two sets of factors: a) degree of similarity of the items presented, and b) conditions of presentation.

Absolute similarity proved to be very important for successful matching. If the items to be matched were not absolutely identical in every respect this often proved to be an obstacle to the solution of the problem.

In one of the experiments Lanuti was asked to match drawings on single small cards to drawings on a larger card (picture lotto). He had previously examined this larger card and had named the pictures on it. When given a small card with the picture of an apple and asked to find "just the same," he glances at the identical picture and declares: "No same! . . . This big (the apple on the larger card)—this short." He throws the small card away with contempt and says pointing to the large one: "*This* good!" The following cards are rejected in the same way: he either maintains that they are different: "This cow—this jackass . . . ," or simply that the picture on the small card is no good, whereas that on the large card is good.

Although the drawings the patient compares are exactly alike and identical in size, the fact that one of them is printed on a larger card, together with some other pictures, is sufficient to preclude the arousal of the impression of identity in the patient. He himself, however, is mostly unable to name the basis for his impression that the two pictures are "no same." The following examples show similar difficulties in the matching of real objects.

Ball. Lanuti takes the two balls in his two hands, turns them both around, and says presently: "Not the same!" pointing out that there is a small spot on one of the two tennis balls and not on the other.

Knife. Lanuti turns the sample object in his hand, tries to cut the cardboard with it and says with great conviction: "No good the knife!" He then picks up the second knife, tries it out and says approvingly: "This is good!" He does *not,* as usual, place the first knife at the side of the second, but returns it to the examiner saying: "This is no good!"

The 'solution' in the following case, however, seems to be the exact opposite of the first two.

Pencil. Lanuti writes with the sample pencil, puts it at the side of the pipe, attempts to write with the pipe, and says in an uncertain tone of voice: "Just the same."

In this last case the patient matches two objects which are totally different, in the first two he refuses to recognize the objects as identical because of a difference which passes completely unnoticed by a normal person. Both kinds of behavior, however, result from the fact that the patient in his search for "just the same" does not have an idea as to *what* will constitute the sameness, what is important and what is irrelevant in this respect. Instead of applying some kind of criterion he is passively determined by the arising impressions which might be those of similarity, or of dissimilarity, according to the momentarily prevailing aspect. It is characteristic that each of the three objects mentioned above was once matched correctly in the course of the same experimental sitting.

The example with the knife also shows that real action may have the same importance for the grouping of objects as for their recognition. Whereas a normal subject also considers the function of the knife as its essential characteristic, he classifies the objects with regard to the functions they are *meant* to perform. For the patient, however, the *actual* functioning is the only important consideration.

Whereas with objects the dissimilarities discovered by the patient were purely accidental, with colors they were introduced on purpose, and brought out the same phenomena even in a more marked form. Lanuti was asked to match the colors of a large picture to small

strips of colored paper. He rejected a strip which had the same color as an object in the picture, pointing out that the object was larger: "See big!" Another time he called the picture "glass" because of its glossy surface, and, after having doubtfully palpated the rougher surface of the strips of the same color, he refused to acknowledge them as "same," although he was definitely asked to look for the same *color*. He was unable to abstract the color from the other characteristics of the compared objects.

The absolute identity of the items, however, was not in itself sufficient to ensure the correct solution of the problem. Success in matching depended also on the conditions of presentation of the items. If, in the matching of colored strips, the sample strip was shown only for a short time and then taken away, the patient committed the same errors which he committed in naming colors, choosing, e.g., blue for green, orange for red and yellow, violet for black.[9] The correct choices became somewhat more frequent when the color sample was not taken away, but left on the vertical screen placed at some distance from the patient. Further improvement occurred when the sample was placed on the table immediately over the color series, but even here errors were frequent. Only when Lanuti was induced to take the strip in his hand and was told to "put it on one that looks just like it," did the performance result in complete success and all five colors used were repeatedly matched correctly.

This success was obviously due to the changed procedure. The patient puts the sample on top of the strip at which he happens to look first, smoothes it up carefully so that their surfaces coincide, and examines the effect attentively for a long time. Yet, he always removes the sample from the incorrect strip and repeats the procedure with the next one, usually taking all strips in succession. When the identical strip is reached, Lanuti expresses complete gratification and stops his search. In this case, although the patient's whole procedure shows that he knows as little as ever before *what* it is exactly he is looking for, the characteristic effect of merging of colored surfaces leads to a fulfilment experience and enables him to stop immediately when the correct solution is reached.

The same general rules obtain for matching of objects. Under conditions which destroy the simultaneity of identical impressions the patient experiences great difficulties in matching. This occurs, for instance, when an object is shown for a short while only and then removed before the patient can make his choice, or when he has to choose a match for an object which he is allowed to examine only by touch behind his back. The choices made under these conditions are very uncertain and often faulty.[10] If however the patient is left free to use any procedure he wishes and the time of exposure is not limited, he frequently succeeds in picking out the second of the identical objects. This is only seldom achieved by naming or by

[9] It was conspicuous that he often for a long time gazed at the place where the strip had been, and that, when he finally lowered his glance to the row of colors on the table, he failed to go over it systematically, so that often the wrong color was chosen before the correct one was seen. Because of this weakness of systematic searching and of the confusing effect of many similar colors, the chances for success were the greater the fewer colors were presented.

[10] This may partly be due to his lack of systematic procedure in examining objects by touch.

trying out the objects. More often the patient uses methods that enable him to obtain the impression from the two objects simultaneously, such as taking one object in each hand while looking at them. It seems that only the immediate perception of identity which is possible in such a setting yields the basis for a more secure matching. Yet objects, unlike colors, remain separate entities under any conditions of presentation, and cannot achieve a degree of unification sufficient to produce the fulfilment experience in the patient.

Experiments done with the comparison of sizes showed that the patient was unable to point out the longer one of the two strips differing in length by one inch (e.g., three inches and four inches). He made his choice purely at random, even if the strips were lying parallel to each other. Yet, when the examiner placed the strips side by side, and in such a way that their ends coincided, he chose the longer one quickly and with a definite fulfilment experience. After that he occasionally applied this method of his own accord, and at such times, but only then, made correct choices. This procedure, however, was limited to a comparison of only two strips. The task of ordering three or four strips according to size, or that of ordering blocks according to height, seemed to remain completely incomprehensible to him.

To test the patient's ability to arrange in order blocks according to height the examiner built a stair out of four blocks of different height and asked the patient to reproduce it. Lanuti did it by placing the highest block next to the shortest, and by using for the highest step two medium blocks, one placed on the other. Thus, he solved the constructive task, but without fully solving the disguised one of ordering the four blocks according to height. This episode demonstrates the difficulties the examiner sometimes encounters in trying to transform a 'theoretical' task into an equivalent concrete action task.

Experiments with matching of shapes, in the form of simple form-boards not only confirmed the observations made on other material but also revealed certain new phenomena, and showed the manner in which the solution of the problem passed through different stages. Therefore the results of this particular task are described in greater detail.

That the patient did not altogether lack form perception, could be seen from his 'recognition' of objects and also from the fact that he was able to copy correctly on the whole such simple shapes as a square, a circle, or a rhombus. Yet the form-boards present an additional problem of abstraction: in order to find by mere inspection the depression for the given block, or vice versa, the subject has to identify a block, i.e., a three-dimensional isolated body, with a thing of a totally different appearance—a depression, one among many on the board, and differing from the block in color. This can be done only if the shape is taken as a basis for comparison. But, although this basis is suggested by the task of fitting in the blocks, it proved far from being a matter of course for the patient.

Since letting the patient have all blocks at once led to a pure trial-and-error procedure on his part, the following method was used. Only three depressions, e.g., triangle, circle, and cross, were left open. Lanuti was shown one block at a time from afar and asked to point out the depression into which he would put it. The block was then handed out to him, and after being placed, was again removed by the examiner, and the next

block presented. When the same set of blocks was repeatedly shown to the patient in this way, the solution showed two typical stages.

At the beginning the patient was completely unable to place the block correctly without actually trying it out first. He would try to force it into each of the three depressions in turn until he hit upon the correct one. The fitting of the block usually came as a complete surprise, and with its striking 'clicking effect' often gave rise to a strong fulfilment experience. Lanuti would take the block out and fit it in again, or tap it emphatically, laugh and repeat with satisfaction: "Yes, yes—good here, sleep here!" At this stage the actual fitting in of the block is the patient's only purpose and the only indication of the correct solution that he has.

Gradually the mere trial-and-error gave place to a different procedure. The patient formed certain clues by which he identified both the block and the corresponding depression. He would, e.g., count the number of corners, or trace the shape of the outline with his finger, or give the block the name of an object. As soon as such clues appeared, the patient was very eager to obtain mastery of the solution, and became very much excited when by subsequent trying out he found his choice to be a failure. He also tried repeatedly to explain and demonstrate the clue to the examiner: "Yes—see round—and here round," "Same," "Cookie—cookie there," etc.[11] The clue might change in the course of the experiment, but usually it became more or less stabilized, and Lanuti became gradually more secure in his choice. He no longer would reach for the block with the urgent request: "Me try!" and in the end he simply pointed out the correct depression and was willing to omit the actual placing altogether. The fulfilment experience seemed to shift forwards, to the moment of arousal of identical clues by block and depression. When this stage is reached, the quick and correct choices may give one the impression that the patient perceives the identity of shapes much in the same way as does the normal. However, a small change in the setting may suffice to show that this is not the case.

After Lanuti had learned to identify the square by its right angles, he has to make a choice between the two depressions—a square one and a long rectangular one (in the former experiments he had to choose between square, oval, and star). For a normal observer the difference of the two shapes is striking, but the patient hesitates, carefully traces the outlines of both depressions, and says with a puzzled shrug of the shoulders: "Just the same!" Taking the block, he tries to place it into the rectangle, is very much astonished that it does not fit and puts it slowly in the square. Quite contrary to his usual joy at things fitting and being right, he seems puzzled and depressed by his success. He takes the block out and tries it again in the rectangle, then shakes and slaps his head, and looks at the two depressions intensely, apparently trying to memorize the correct one.

This example shows that the usual effective working of the clue is more or less a happy chance; the patient has no insight into the reason why the clue works, and may therefore use an inadequate one as well.

In surveying the results of all matching experiments, we find that the patient's best solutions were based on characteristic perceptual experiences, such as the merging of color surfaces, the fitting

[11] It is interesting to note that when the statement of shape has been first obtained by tactile inspection, the patient in all following experiments usually insisted on tracing with his finger both depression and block and had great difficulties when forbidden to do the latter.

in of blocks into depressions, or the coinciding of strips of equal length. Such methods, however, were seldom found by the patient himself: they were suggested either by the examiner (as for colors and sizes) or by the task itself (form-boards). When the patient is manipulating the material in different ways, he seems merely to try to bring about a situation in which something will happen to tell him that his choice was right. Since he himself lacks a definite idea of *what* he expects to occur, he cannot use the non-occurrence of the effect as a criterion of falsity, and may spend a long time examining two surfaces of strongly contrasting colors before he discards the match. In the moment, however, when the 'clicking' actually occurs, it produces a strong fulfilment experience, and the solution based on it is a well-founded, a momentarily complete and meaningful one.

In a setting that does not permit of any such striking perceptual effect the solution becomes highly problematic. There is nothing to ensure the constancy of the direction of comparison, and the impression of similarity or difference may arise depending on the momentarily prevailing aspect of the compared objects. This may lead either to identifying of different objects or to rejection, because of very minor differences, of identical ones. Chances for correct solution are highest when two absolutely identical impressions can be obtained from two objects. When the objects differ in some respect the difficulties increase, and even the definite directions given by the examiner, such as: what has the same color?—do not ensure the effectiveness of the given category. The performance is characterized by failure, such as persistent wrong matching of colors, or long intensive comparing of a round block with a triangular depression. Subjectively the patient's state is that of insecurity and confusion. The solution in this setting requires the use of categories, it requires acts not fully founded in immediate perception, and these acts the patient is not able to produce.

From this state of uncertainty and failure the patient may escape by finding certain clues in the object and by holding on to them, as if to find firm points in the disorganized objects. Even when these clues appear initially without any relation to the task, they are later on used purposefully, with a marked desire to master the task. We may ask how the matching by clues is different from that by use of categories. It might seem that in designating the two objects as round or four-cornered, the patient applies a definite category to both. His awareness of the clue and the purposiveness of its usage are also typical for categorial thinking. The fact that the clue is not based on any clear insight into the structure of the task and may, therefore, prove inadequate, might possibly be considered irrelevant in this connection since conceptual thinking does not exclude the use of arbitrary or superficial categories. What is essential, however, for conceptual thinking is the relation of greater and lesser generality. A quality of an object, seen categorially, is not an individual mark merely attached to the thing—it is something that has a greater generality and changes the concrete object from a mere individual entity into a participant of this generality. This relationship of generality makes possible the organization of objects under systems of concepts. None of this holds for the clue. The latter is merely affixed to the thing as a label. The process of affixing it can no more be considered as subsumption under a category

than can be the putting of a mark on an object, although both procedures may help in identifying or matching. Instead of determination by a category which encloses the object, one has here a mere indication of the object by something else of the same concrete order.

Yet, although matching by clues is not a categorial procedure, it probably represents a higher achievement than the purely perceptual matching, in spite of the fact that the latter leads more frequently to correct solutions. The patient is more active in finding the clue, has a greater awareness of the clue than he has of the reason of 'clicking' in a perceptual solution, and has a different attitude towards the results obtained. Instead of being satisfied with the block being fitted into a depression he is eager to destroy the achieved result and to repeat the procedure in order to test or verify the efficiency of the clue: the method of solution becomes more important than the material result of his activity. Although rational insight into the method was never gained by Lanuti, yet all of the adduced characteristics of the usage of clues indicate a higher level of development than that of perceptual matching. It is true that the method of clues is not applied until a more primitive solution is made impossible by the conditions of the experiment; it probably represents both a less efficient and a less natural method for the patient. Yet it is significant that in case of necessity Lanuti can create and use clues, i.e., he can use one thing in relation to or instead of another.

5. SUMMARY

Tests requiring naming and matching of objects, pictures and colors have shown that environmental objects are adequately mastered by the patient only in so far as they permit practical, 'concrete' behavior on his part. The different tasks are solved more or less adequately, according to the degree of their connectedness with an action-situation. Thus real objects which are immediately put into action by the patient are recognized correctly more frequently than pictured objects which cannot reveal their nature through real action; objects offered in a setting permitting an action (key with lock) are recognized better than those presented in isolation; pictures representing people in action are responded to more readily than those representing objects, whereas the recognition of colors, which have no specific action or use, proves especially difficult. The tendency to action is so strong that even situations evoked by pictured objects are acted out by the patient, although in this case action is found to follow rather than to precede recognition. An interesting fact is the extremely good appreciation of the facial expressions. In general one might say that objects presenting an opportunity for an action familiar to the patient have a better chance to be recognized by him than those presenting no such opportunity. For different objects data of different senses provide the clues for recognition: no one sensory field seems to be of unique importance.

When the patient gets completely absorbed in his action—as, e.g., in acting out a pictured scene—he often loses the set for the specific task of recognizing and naming the represented objects. If this set is retained, however, the adequate functioning of a (real) object often leads to a recognition characterized by the striking experience of immediate certainty, of 'complete fulfilment.' In the matching experiments this experience of 'clicking' may be produced by some perceptually striking event, such as merging

of colors, or fitting of a block into a depression of the form-board.

When no such happy event occurs the patient's recognition of objects is faulty and extremely insecure. The various characteristics of an object—its shape, color or a conspicuous part—may in turn determine the interpretation. In matching, the two objects appear now as identical, now as different—according to their momentarily prevailing aspects. Application of definite categories which insure structure and relative constancy in case of normal perception is missing from the perception of the patient. The only type of solution that indicated a higher level of awareness consisted in finding or creating clues. In solving the form-boards this meant performing the same action—e.g., counting the corners—both on the block and on the depression, and choosing the depression where counting yielded the same result as on the block. The method of clues may seem to be based on application of categories, but a closer analysis shows that it belongs to the sphere of concrete behavior. The inability to view the material under a certain category is shown most strikingly in the patient's failure to maintain a definite point of view in sorting objects. The task is so abstract for him that he does not even understand what is required of him, and often responds by psychological 'freezing' or excitement. The only adequate mode of behavior for Lanuti is that of concrete immediate action. An object for him is only an integral part of an action, and has little meaning outside of this context.

IV. Spatial Organization

1. Behavior with regard to space

When psychological work was started with Lanuti it soon became obvious that his orientation in the hospital environment was grossly impaired. Even after having made the trip from the ward to the laboratory dozens of time, he was still unable to find his way by himself. If asked to do so he rushed along the corridor until he arrived at a corner where he might hesitate for a moment and then rush headlong in any direction, right or wrong. In the laboratory when asked to find the room in which he always was tested, he puzzled in front of the three doors in the hall, unable to find the right one. He was very depressed by his failures and attempted to devise methods for orienting himself. For example, in trying to find his testing room in the laboratory he hit upon the trick of counting the windows, his room being the only one that had three. He still could not decide on the right door beforehand, but on entering a room would eagerly count the windows and then either leave the room or happily declare that this was the right one: "see—one, two, three—found the room!" On the ward with its long rows of identical rooms, Lanuti would go into any room and stay there until the returning owner chased him out. Finally in the evening he either landed in the only unoccupied room—his own—or was brought there by an attendant. In this situation, too, he acutely realized his failures and made some attempts to overcome them. Once, when the observers took him back to his ward and asked him to show them his room, he entered three rooms one after another and then, in the fourth one, rushed to the bed and showing the observer a piece of string tied around the bed post exclaimed excitedly: "See this? This is my room!" Apparently he himself had tied the string to the post in an effort to create a clue that would enable him to identify the room as his.

After having spent a few months in the hospital Launti was granted parole, meaning that he had from then on a certain freedom of movement in the hospital and on the hospital grounds. Later he was transferred to the Farm House, a smaller building situated within five minutes' walk from the Main Building. Since he took all his meals in the Main Building this necessitated his walking there and back three time a day. In addition, his work was in a still different place, a little beyond his living quarters. An automobile road had to be crossed on the way from one place to the other.

In order to find out how the patient who seemed incapable of the simplest spatial orientation mastered these complex situations, the observers followed him at different times on his journeys, both in the hospital building and on the grounds. The findings were somewhat different on different occasions and possibly can be considered as subsequent stages of a developmental series.

During the first months of Lanuti's parole he was often seen to watch other patients on the ward at meal times, and to start after them, often attaching himself to some one patient and trudging after him in a dog-like fashion. Thus, during his first period, Lanuti's 'orientation' in the hospital was largely a matter of using for his own movements other people as 'moving clues'. They were supplemented on his routine trips by such static clues as doors, stairs, groups of

waiting patients, and white-coated attendants posted at certain points of the long route to the cafeteria.

At a later period when the patient had been living at the Farm House for about two months, he was once asked to go from the laboratory to the Farm House. He consented readily and started looking for the way to the Farm House behind different doors of the laboratory, finally becoming quite angry at its failure to appear. The examiner took him out of the building and again urged him to find the Farm House. Lanuti walked back and forth in front of the building until he discovered another patient at a distance. Joyously shouting to the observer: "Man!" he rushed to the patient and eagerly asked about the farm. The man pointed downhill and Lanuti started along the path leading in that direction. When the path divided in two, he stopped, hesitated, then bent down trying to see through the branches of the trees that obscured the view. From this position the Farm House could be seen at a distance, and apparently the patient saw it; he rushed in that direction and very soon reached the house. The observer next suggested going to the house where the patient worked. Lanuti started out and, arriving at the place where he had to cross the road, stopped, looked, saw the house and started walking towards it. As he passed familiar landmarks he pointed them out to the observer: "See, wall, road here; see, big tree, house." Yet, when at the last turn of the road the observer asked him how he knew where to go next, he became quite insecure and took the correct direction only after much hesitation. He hesitated once more in front of the building; then looked through the door, apparently recognized the place, and walked in with certainty, looking greatly relieved.

Eight months later the patient was observed again, this time without his knowledge, on the same trip from the Main Building to the place of his work. At first he walked with a group of patients, without appearing anxious to keep them in sight, and when he lost them, he seemed undisturbed and continued the trip by himself. He gave the impression of being absorbed in his thoughts, talked to himself continuously and apparently paid no particular attention to where he was going. Yet he took each turn correctly without hesitation and, in a short time arrived at his destination. He appeared to have acquired some sort of mastery of this route which was followed now as a whole, without any obvious attention to its parts. Unfortunately no attempt was made to test whether this automatized performance could be easily disturbed, whether the clues he was following could still be made conscious at that stage, or whether he had formed any new methods for finding his way about.

The patient's difficulties in spatial orientation appear similar to those he experiences in recognizing objects. Unable to grasp the essential relationships of parts and to form an organized structure—in this case a spatial schema of his surroundings—he uses some isolated clues which, in a favorable case, make the correct performance possible. With time and endless repetitions of the same activity—e.g., of the trip from one building to another—the series of clues may become stabilized and insure a smooth and apparently normal performance. It is likely, however, that even at this stage, by changing some of the clues, or by introducing some other disturbance, one

could disrupt the performance and thus prove the absence, or the inadequacy, of the spatial schema that normally is the basis of orientation (17). Actually throughout the period of his parole, Lanuti frequently got lost, both in the hospital building and on the grounds. Occasionally he even stayed out overnight, unable to find his way home, and was brought back by the police.

In spite of all this imperfection of his performance it is important to note that finding his way in the hospital surroundings was one of the few fields in which the patient showed definite evidence of learning. It is possible that his success in this field was due to the vital functions served by locomotion: he had to get to meals, or to his room to sleep, and this natural connection with vital goals must have served as a powerful incentive to his attempts at mastering the surrounding space.

2. BEHAVIOR WITH REGARD TO OWN BODY

When Lanuti is asked to point to his nose, eye, ear, head, he makes such mistakes as pointing to the ear instead of the eye, to the foot instead of the hand. The patient has difficulties in understanding verbal directions and may fail on this account. However, even when he seems to understand the command and shows correctly the part of the body named, he does it in a very hesitant and inaccurate way. In response to the demand to show his ear, e.g., he often touches with his palm a wide area on the side of his head which may or may not include part of the ear. Other parts of the body are frequently indicated in the same insecure the inexact way, which suggests a lack of differentiation of his 'image of the body' (38).

Another demonstration of this defect is the patient's inability to tell off-hand the number of his feet, eyes, fingers, etc. Again and again the examiners witnessed the strange spectacle when Lanuti, in response to questions of this nature, would, e.g., grasp his nose[12] and announce in a tone of discovery that he had *one* nose, or would eagerly count his eyes and state that there were two, not without having first carefully palpated the back of his head for a possible third one. This behavior cannot be explained by poor appreciation of numbers, because the numbers up to three were mostly used correctly by the patient.

In attempting to test the discrimination of directions, we found that the words "right" and "left" were meaningless to the patient, and all attempts at explanation were without success. When told that the right hand was the one that held the pencil in writing, Lanuti showed that he could take the pencil in the other hand as well. He was unable to memorize which hand was the right and which the left one, or to apply these concepts to other parts of the body. Consequently verbal commands such as: put your left hand to your right eye, etc. (Head's tests for aphasia (26)) were never carried out correctly, right or left side being shown indiscriminately. This was not the case, however, in the task of imitating the movements of the examiner. The patient consistently touched his right eye when the examiner who faced him touched her left, and vice versa: the mirror response not uncommon in normal subjects.[13] Thus, a cer-

[12] When the patient finds the required part of the body—e.g., his nose—he does not merely point to it, but actually grasps and holds it. Similarly, when asked to point to an object he often impulsively grasps or touches it. He thus shows the same inability for mere pointing as a patient described by Goldstein (11).

[13] The reversal always took place in regard to the part of the body to be touched, but not

tain primitive differentiation between the two sides of the body is present, but the relational concepts right-left do not exist for him as such.

The findings were similar for the directions 'up' and 'down'. The idea of direction as such was absent in the patient, yet 'up' and 'down' were responded to differentially when they were integral parts of an action. On hearing 'down' Lanuti would precipitate himself to the ground, and jump up again to his feet in response to 'up'. Attempts to train the patient by making him imitate the examiner's gestures and respond to the commands 'up' and 'down' merely by pointing, led to no success.

Some brain-injured patients described in the literature were found to use certain concrete substitutes for the abstract concept of direction: 'Up' meant to them, e.g., in the vicinity of their heads or the ceiling; 'down' meant on the floor, close to their feet (8, 10). Attempts to uncover such tendencies in our patient by testing him in a position other than upright, e.g., lying down, resulted in complete failure. If he was forced to keep his position, he apparently had no way of responding to the commands "point up" or "point down", and became totally bewildered. Obviously, 'up' and 'down' did not mean spatial directions for him at all, not even the more concrete directions relative to his head or to the ceiling. They were merely commands for certain familiar actions, those of lying down and getting up.

3. CONSTRUCTIVE ACTIVITIES

The patient showed definite disturbances of the so-called constructive activities, such as building, drawing, solving picture puzzles, all of which in a normal performance imply spatial organization. We tested especially solving of puzzles, drawing, and cutting out of patterns.

A. *Solving of Picture Puzzles*

The puzzle used most frequently consisted of a square picture of a dog, divided into four equal pieces by a horizontal and a vertical cut. Of the two upper pieces one contained the head, the other the back of the dog, while each of the lower pieces contained a pair of his legs. The patient attacked this task very eagerly, tried out different combinations of pieces, deliberated and puzzled over each of them, and yet was unable to produce the correct arrangement. He looked worried and anxious as he kept rearranging the pieces and sometimes remarked: "Me turn round and round and cannot fix", or "Work long for nothing." If through mere chance or through the examiner's help the picture was completed correctly, Lanuti realized it and exclaimed joyfully: "Looks good now!" He seemed to have the same experience of fulfilment that he had when objects functioned correctly, or pieces fitted into the form-board. If a piece got out of place, he noticed it at once and commented with a puzzled look: "No look good no more." Yet he was unable to repair the damage.

In spite of the strong fulfilment experience the patient did not stop at mere chance solutions. He repeatedly destroyed the finished puzzle in order to see if he could complete it correctly again. In the course of these attempts a variety of procedures was used. The most primitive and inadequate one consisted of carefully pressing together two pieces chosen at random and smoothing their edges. More reasonable but still not very

always in regard to the hand which touched it, left and right hand being often used indiscriminately. Obviously the action for the patient was touching this eye, this ear, and not touching it with this hand.

effective was the method of trying to find a continuation for the contours of one block in the contours of another, but without consideration for the total figure produced in this way. After many disconcerting experiences with these only half-heartedly attempted procedures, a new method suddenly appeared. The puzzle, at this moment, was in front of Lanuti, correctly arranged by the examiner. He impulsively snatched a red pencil out of the examiner's hand, demanded more colored pencils, and marked the four pieces of the puzzle with different colors. He then mixed the pieces up, obviously hoping to be able to reconstruct the puzzle with the help of these earmarks. When he found that the color marks told him no more about the order of pieces than did the pictures themselves, he was very disappointed and puzzled.

One procedure, however, led, at least to partial success. In looking at the completed puzzle Lanuti noticed a house in the background of one of the upper pieces and remarked: "House on top." He then destroyed the puzzle and, putting the upper pieces together again, said: "First house on top, then head." After that the two lower pieces were added and the puzzle was for the first time correctly completed by the patient without assistance. In contrast to his dissatisfaction with chance successes, Lanuti was now very happy, and repeatedly 'explained' the solution: "See—first house, then head—pretty good." He obviously had a feeling of having finally mastered the method of solution. Since this method was based on a purely arbitrary sequence, it did not become stabilized, and at the end of many weeks of experiments Lanuti was as helpless in attacking this puzzle as he was in the beginning.

The patient's performance with puzzles shows that he does not appreciate the spatial relationships of the parts of the puzzle to each other. Instead he tries to follow some isolated arbitrary clues, or to create such clues when they are lacking, but does not succeed in producing clues that would be adequate for the purpose. Not having found any efficient method of solution the patient in time lost his interest in the task and displayed an increasing tendency to accept any arrangement of the pieces as the correct one.

B. *Drawing*

On repeated occasions the patient was made to copy designs of various degrees of complexity, and occasionally he drew certain familiar objects from memory. Although his normal achievements in drawing are not known, his performance during the period of observation showed peculiarities that merit a brief description.

In copying simple figures such as a cross, circle, triangle, square or arrow, the patient was moderately successful. Occasionally the figures were drawn quickly with large strokes, but more frequently the copying was a slow and laborious process, carried out by numerous small strokes with continual close examination of the model. However, with simple designs Lanuti's performance did not suffer much if the figure to be copied was shown for a short time only, and the continual observation was made impossible. When somewhat more complicated designs were offered, the patient's difficulties and limitations became more obvious.

The first of these difficulties concerned the *positions* of the figures. The characteristic positions, such as the vertical and horizontal were rendered correctly, but

a figure offered in an oblique position was frequently shifted into the more 'stable' horizontal position, a phenomenon often observed in the copying of young children (21).

The second peculiarity consisted of a tendency to render straight lines and angles by *curves*. Thus, a turret-like figure was drawn as a wavy line, and on a few occasions even the angles of the square appeared rounded so that the square approached a circle. This might be considered as an exaggeration of the well known tendency to simplify and regularize shapes—a tendency that, in normal subjects, is found, e.g., in tachistoscopic perception, or in reproduction of meaningless figures after a period of time. It is likely, however, that the motor factor plays an important role in the substitution of curved for straight lines, since the curves are produced by an easy and natural movement of the hand, which accounts also for their predominance in the early scribbling of children (2).

The *sizes* of the figures were seldom reproduced correctly. Most of the designs offered for copying were rather small—ca. one inch in maximum linear extension—and the patient showed a definite tendency to enlarge them to about twice that size in his reproductions. Experiments with larger designs (six inches) brought forth the opposite tendency, towards the diminution of size in copying, although this tendency was not as pronounced as that towards enlargement of small designs. These results indicate that the patient possibly tends to change the pattern in the direction of a certain optimum size, a size most adequate for easy effortless movement. Such optimum motor patterns exist for normal subjects also, but the latter are better able to control them in accordance with the demands of the task than are the brain injured patients (13).

More pronounced than the inaccuracies in position and size was the following disturbance of copying. The patient frequently failed to copy the more complicated designs correctly in detail, and instead gave a reproduction of the general impression he received from the design. Such 'global representations' are frequently found in the copying of young children. To give an example, Lanuti was never able to copy correctly a five or six pointed star. Instead he drew a wavy circular line or made a circle and then drew a zig-zag line around it. Although emphatically asserting the identity of the two designs, Lanuti was frequently dissatisfied with such approximate reproductions and occasionally attempted an additional representation of details. Thus, on having copied the turret-like figure as a wavy line, he looked at the original design closely and then added a few short horizontal lines connecting either the tops or the bottoms of the adjoining waves. This was obviously an attempt to render the straight sides of the figure, an attempt showing the typical inability of the patient to analyze the general impression into its components. Lanuti is capable of seeing both 'the whole' and 'the parts', but he is unable to grasp how the parts make up the whole. To do so he would have to account to himself for the spatial relationships of the given figure. Strictly speaking, there is no whole and no parts for him, but only a succession of different unrelated impressions produced by the design.

Drawing of objects from memory was not tested systematically, mainly because from the beginning of the experiments one object of representation completely thrust out all the others: this object was "man," actually only the head of a man. The first picture of a man was drawn in response to a suggestion

of the examiner, but from then on it was frequently drawn spontaneously, and proved to be one of the 'adequate' satisfying tasks which could be relied upon to calm the patient whenever he became excited or depressed by his failures in other tasks. He was always very much absorbed in this task, worked with a relaxed and quiet expression, and showed great pride in the finished product, emphatically declaring that it was a good picture and praising himself for having made it. The pictures of which more than fifty were collected over a period of three years, show only slight variations of the same primitive schema. The variations are mostly in the number of details. Typically the head is drawn in profile facing to the right, the most prominent features being the nose and a pipe or cigar protruding from the mouth. Eyes are represented by dots, and in spite of the profile representation there are usually two of them placed close together. In one drawing the eyes appear outside of the outline of the head. Hair is indicated by spirals, and the ear is seldom missing, although it frequently appears in an inverted position. Lips, forehead, eyebrow and a collar are indicated occasionally. The chin is invariably missing. The picture was usually interpreted by Lanuti as a man or as "me", but on a few occasions he, on request, made the picture of the observer, actually putting in some individual characteristics, such as curly hair, a lace collar and a cigarette instead of a pipe. On the whole, however, the drawing of a man was stereotyped and therefore an easy activity for the patient. This ease of performance together with the palpable and satisfactory end-result which, in addition, was invested with a positive emotion as the patient's self-portrait, probably accounts for this task becoming his favorite activity.

C. *Cutting Out Patterns and Other Motor Performances*

The patient was repeatedly given the task of cutting out a circle of ca. four inches in diameter and a five pointed star of somewhat larger dimensions. Both figures were drawn in pencil on separate square pieces of thick paper, and large straight scissors were used for cutting.

In cutting out the circle the patient made a series of straight cuts, either secants or tangents, so that the result was a polygon. He then snipped off the corners, but this only led to the formation of new corners, which again had to be cut off. This process continued for some time, but the final product was still a polygon, in some cases approaching the shape of a circle, but always much smaller than the original pattern. The examiners demonstrated to the patient how he could keep the scissors on the circumference of the circle by turning it continuously. He made some attempts to imitate this procedure, but soon reverted to his original method.

The star pattern, although containing no curved lines, proved not less difficult than the circle. Lanuti used two methods. In one he started cutting along one of the sides of a ray, but at arriving at the turning point, turned the scissors only slightly and therefore cut into the next ray. At other times he started by connecting with a straight cut the tips of two rays and then attempted to approach the angle between them by a series of straight or only slightly curved cuts. In both cases the tips of the rays were cut off and the star was completely disfigured. Lanuti was dissatisfied with this result but unable to find a better method by himself. The examiner showed him that he could first cut along one side of the ray, then discontinue the cut and start cutting along the side of the next ray, until both cuts met, thus escaping the necessity of turning the scissors. This procedure was applied by Lanuti with a certain degree of success, but never mastered completely, although the experiments were continued for many weeks.

The patient's difficulties in this task cannot be explained by motor difficulties alone, nor by his not perceiving the

shape of the patterns: we know that he was able to copy simple shapes, such as a circle, approximately correctly. Obviously, however, he gets into difficulties when the pattern requires movements different from the long straight cuts suggested by the instrument he uses: he cannot translate, as it were the seen circle into a motor pattern. Perhaps one could say that the patient is unable to control his movements by his perception of spatial relationships to a degree sufficient to overcome his preference for the easiest movement, such as straight cutting, or curvilinear drawing. Ultimately this difficulty may be due to the patient's inability to render account to himself of the spatial relationships. A normal person who, even without knowing the geometric definition of a circle, perceives it as a figure equally rounded in each section, easily strikes the effective method of cutting it out by turning scissors or paper. The patient, however, who probably sees the circle only as enclosed space, proceeds to cut off the rest of the paper, and does it with a series of rectilinear cuts which are easiest to make with the tool at his disposal. That this performance is not due exclusively to the motor difficulty of the task is shown by the fact that the patient was able to imitate the correct method shown by the examiner, but when left alone soon reverted to his own; the rationale of the examiner's method based on the structural characteristics of the pattern must have remained hidden from him.

To a certain extent this explanation is borne out by observations of Lanuti's failures and successes in his every day dealings with the environment. The failures were most frequent in performances that required insight into spatial interrelations of objects and the relationships of weight, stability, etc. Once, e.g., he found his way barred by a door which could not be moved because a corner of a table was in its way. Instead of removing this slight obstacle by pushing the table, Lanuti promptly climbed over the table: he moved himself where a normal person would have changed the environment. The patient was unable to do the latter because he obviously did not realize what it was that prevented the door from closing, although to a normal person the situation was clear at a glance. One is reminded of the performance of Koehler's apes (30) who, in seeking to remove a ring placed over an upright stick, were unable to see that they had simply to lift it, and tried in vain to move it by violent pulling. Instances of such failure to analyze the spatial situation into its components and to act accordingly were very numerous with our patient. Although he was fairly successful in the routines of eating and dressing, the spatial analysis required by such actions as tying of a tie, or untying of a knot was at all times beyond his capacity.

Some of Lanuti's motor performances, on the other hand, were even superior to those of normal persons. Once during a walk on the hospital grounds he saw a bird in the air and, in an attempt to catch it, rushed to the nearest tree and climbed it. The way in which he climbed was remarkable. He apparently did not look at all where he put his feet, and actually put them on the most precarious supports. Yet, as he climbed with the greatest speed and abandoned each insecure position for the next one before the branches could break, he did not fall and in a few seconds reached the top. There he swung and rocked himself with great delight, totally unaware of the danger of the situation. When finally persuaded to come down he did so with the

same striking speed and adroitness. His performance throughout was more similar to that of an ape than of a human being.

The patient's failures and successes in different motor performances are not inconsistent with each other. One might even say that the inability to account to himself clearly for the relative positions, sizes, shapes and stabilities of objects which made the solution of constructive tasks impossible for the patient, enabled him also to perform such unusual feats as the one displayed in climbing. He had no misgivings about using any support that presented itself because, unable to judge its relative position and stability, he had no appreciation of the dangers involved. The rest was achieved by the automatic readjustment of balance which, in the absence of all inhibitions arising from conscious control was brought fully into play and insured a successful 'apelike' performance.

4. SUMMARY

The common element of the various performances considered in this chapter is construction, or organization in space. In all of these performances our patient was strikingly deficient, and either produced inadequate solutions or failed completely. Frequently he attempted to solve the problem at hand by utilizing some single part or aspect of the situation rather than its structural characteristics. Thus, whereas a normal person in trying to find his way in partly familiar surroundings will be led both by a more or less adequate mental map he possesses of them, and by single outstanding clues, the patient seems to have at his disposal only a number of single clues which can never adequately replace a coherent pattern, although they may function effectively in a favorable case. His body schema seems to be poorly differentiated, and he cannot be made aware of the directions determined by it, such as right-left and up-down. In the task of solving picture puzzles the disturbance appears most clearly: the appreciation of the relative positions in which parts have to be placed to produce a complete picture is conspicuously absent and instead the patient makes attempts to attach clues to the single parts. This procedure, which could work in the case of formboards, naturally remains futile in the case of picture puzzles, since the marks on single pieces can tell nothing about the order in which they should be placed. The copying of patterns suffers because different characteristics of the more complex pattern—such as its general shape, or the rectilinearity of its parts—become effective in turn in determining the patient's drawing. Their relationship to each other is not appreciated and no synthesis is reached. In addition, the patient has difficulties in translating the visual into the motor pattern. Since the movements he makes with his pencil are not controlled strictly by the structural characteristics of the model, the primitive motor tendencies towards rounded movements, or movement of an optimal size became effective and further distort the product. This difficulty of translating the pattern from one medium into another is especially obvious in the performance of cutting out paper patterns.

Thus, in all attempts of the patient to deal with tasks requiring construction in space we find the same inability to become aware of the essential structural relationships and to act in accordance with them. We have seen how, during the patient's attempts at recognizing and sorting objects their different aspects—shape, color, different parts—in turn

determined his interpretation, without ever becoming synthesized and hierarchically organized. Similarly in perceiving or constructing spatial patterns and in manipulating environmental objects, Lanuti shows no appreciation of the role of parts in the whole, or, to be more exact, shows no appreciation of the existence of parts and whole. The essential aspects and relationships are not seen as such and hence do not govern the performance, whereas isolated parts are often chosen as guides for action. The lack of rule, of principle, of concept thus shows itself not only in dealings with meaningful objects, and not only in tasks—like sorting—that require an explicit statement of principle, but even at the level of simple perception and manipulation. We may conclude from these findings that even when the perception of the patient seems to be unimpaired—such as in case of simple visual patterns—it is a perception different from ours, one lacking in the degree of implicit organization typical of normal people.

V. Use of Symbols

1. SPOKEN LANGUAGE

In examining the patient's English speech we find that his sentences are extremely agrammatical, his vocabulary poor, and his pronunciation often faulty. It must be remembered, however, that Italian was the language in Lanuti's home, his wife never having learned to speak English. Lanuti himself apparently acquired no more English than was absolutely necessary for his contacts with the environment. Typical samples of his utterances, secured from his neighbors, make it clear that at the time of his hospitalization his English was no worse than it had always been, with one qualification. Although the patient's difficulty in naming the objects was usually due to failure of recognition, yet in a few instances he seemed to recognize the object but could not find the word for it. In such cases he demonstrated the use of the object correctly by gesture, or gave a word similar in sound, or a description instead of the missing name, as, e.g., "paper . . . go on train" for ticket; "band . . . bad . . . ban . . . they fly over there" for birds; "priest uses" for Bible. When told the right word by the examiner he apparently recognized and promptly accepted it which suggested that the word had been known to him but was unavailable at the moment. This picture indicates the presence of amnestic aphasia. Aside from these few instances of not finding names. Lanuti's vocabulary and grammar were consistent with his earlier linguistic background. Attempts were made to conduct some of the tests in Italian, but as the patient himself seemed to prefer English, these were soon discontinued. However, the few trials made were sufficient to show that Lanuti's speech in Italian was fluent and not strikingly agrammatical.

In spite of this apparently good preservation of language as such, the use of this tool by the patient is very much limited. Language is used by him adequately when it occurs in the context of simple concrete situations. He fails, however, when he is required to use language for representation of objects and relationships that have no correspondence in the immediate situation. This is part of the picture of amnestic aphasia as described and analyzed by Goldstein (15). In the case of our patient, although the symptom of 'forgetting' words is not too conspicuous, this basic disturbance of amnestic aphasia stands out very clearly. This holds true both for active speaking and for understanding of spoken language.

When telling of recent experiences, describing pictures representing simple scenes, giving vent to emotions, or indulging in phantasy play, Lanuti uses his broken English freely and adequately, supplementing it with very expressive gestures, and thus succeeds in making himself understood. Examples of such adequate use of language can be found in protocols throughout the study. If, on the other hand, he is asked to say words that have no relation to his momentary outlook, the task is meaningless for him and he fails. An example of such an artificial task is the repetition after the examiner of words and sentences. The patient was presented with both English and Italian short sentences and single words which were known to have belonged to his former vocabulary. Many of these words were names of objects he used to sell in his store. The results of

this test were extremely poor. Of about thirty single words used, only two, both Italian, *pane* (bread) and *pomidoro* (tomato) were eventually pronounced correctly. Other words were badly mispronounced, most of them in different ways at different times. Thus 'table' was repeated at tenno, treble, and terber; 'house' as gouse and grouse; 'matches' as tech and patches. Of Italian words *uovo* turned to uormo, *terra* to terna. In one session Lanuti started inserting a superfluous 'r' in the repeated words, and this perseverated throughout the session. It could be stated for at least half of the words used in the experiment that in other situations the patient was able to understand and to pronounce them approximately correctly. Thus immediately after repeating the word 'pipe' as tipe, Lanuti was shown a pipe, and asked what it was, at once replied "pipe". His errors in repeating therefore must be attributed to the nature of this particular task. An isolated word, taken out of context and having no reference to the actual situation, has no meaning for the patient; to say pipe when nothing in the situation calls for such a pronouncement is for him a highly artificial and unnatural act. Sentences seemed to have a better chance to be repeated correctly, possibly because sentences more readily evoked a definite situation. It is true that some were mispronounced completely, as when 'it is very cold' turned into ferico, and 'the sun shines' was rendered as sopershy. Still the sentence 'the cat catches a mouse' was with much effort and rather explosively rendered as "catch, catch the mouse", and in many other sentences at least some of the words were repeated correctly. The Italian sentences fared better than did the English, two being repeated in their entirety and others at least in parts. The behavior of the patient during the repetition test showed that this was a difficult and upsetting task for him. He stared at the examiner, stammered, frequently brought the words out only with great effort, and in the course of the test became more and more restless and excited. This effect increased with time, so that it soon became necessary to discontinue the test.

Situations in which language is understood are of the same kind as the ones in which language is used correctly by the patient. Much insight can be obtained, on the other hand, from consideration of situations in which the understanding fails. The most striking failures were observed when the patient was told simple short stories and asked to repeat them. We expected that the repetition would be difficult for him, but actually he had trouble in even listening to the story. In one case which is typical for the patient's performance in general, he was told the following story: "There was a little boy. His name was John. His mother gave him five cents. He went to the store and bought some candy. Then he went home and gave candy to his sister." When Lanuti heard the first sentence he became greatly excited, started looking around in the room and under the table and exclaimed: "No boy, where is the boy, gonna?" The examiners made futile attempts to explain that this was just a story. Finally, to quiet the patient and to make him listen to the rest of the story they had to tell him that the boy was at home, in his house. On hearing this Lanuti made a broad gesture towards the window which was his usual way of referring to any person not actually present at the time. When the mother of the boy was next mentioned he interrupted to say: "dead". On hearing of the five cents he began to look in his own pockets and said: "No got five

cents". At another repetition of the story he responded to the same point with an angry outburst saying: "I no steal nothing, I no pinch no penny, no sir! I not going to jail." Hearing about the boy's giving candies to his sister he said in a disappointed tone of voice: "Oh, gee, to sister, nothing to me!"

Throughout this performance Lanuti was very excited, and the story had to be retold several times before his interruptions and comments subsided and he could be induced to tell the story himself. His final version was as follows: "Bad boy no give nothing . . . No see the boy—gonna home . . . Got five cents and buy candy. No give little candy for me: bad boy, no good boy".

This episode shows strikingly that for the patient spoken language only has meaning as a communication relating to the actual—his own—situation. At best he takes the story as a report of some real happenings, but these happenings remain somewhat vague and disquieting unless they can be connected with the patient's own situation. Lanuti is unable to appreciate a report as fiction and to understand it fully in absence of concrete situational supports. This holds true also of questions and requests directed to him. When he was asked, e.g., to imitate the barking of a dog, he was completely puzzled until presented with the picture of a dog, and then his response was immediate and vivid. In the same way, when asked about the colors of different objects, he made no attempt at response unless the objects and situations referred to could in some way be made actual to him (cp. p. 15).

The patient's peculiarities in the field of language account both for his successes in some situations and for his failures in others. His ability to respond correctly, both with action and word, in simple everyday situations enabled him to get along well with attendants and supervisors, and even earned for him the reputation of a good reliable worker. It was astonishing to see to what extent his defect could be overlooked in such situations. Thus, a farm supervisor under whom Lanuti had been working for over a year, told the observers that the patient understood everything and that he frequently had conversations with him. Yet he was unable to name the topics of any of these 'conversations'. Since it is clear from the foregoing examples that it would be impossible to discuss with the patient such things as politics, sports, or hospital events, we must conclude that the supervisor was impressed by Lanuti's adequate verbal response in concrete work situations, and therefore considered him as capable of normal linguistic responses in general. Actually in this setting of simple manual work done with others, the patient's language responses were as much an outgrowth of the situation as were his actions and gestures, in fact all his responses were so closely interwoven that it was often difficult to evaluate the part played by each. But the most specific function of human language, that of manipulating at will things not present, or even non-existent, is closed for the patient. Even such frequent occurrence of hospital life as questioning by the psychiatrist represents a puzzling, 'inadequate' situation for the patient. The devices developed by him for meeting such situations, especially for dealing with questions of memory and knowledge, will be described in the chapter on memory.

2. READING AND WRITING

The low educational level of the patient limited the possibilities of testing his reading and writing and made the

evaluation of the results rather difficult. Still it seems worthwhile to discuss these results briefly, because they not only reveal gross defects which were to be expected but also exemplify the gradual change in the patient's way of dealing with tasks that were too difficult for him.

We used the methods designed by Head (26) for aphasic patients which test reading and writing in a wide variety of settings. Many of these imply actual presentation of objects, the names of which are to be read or written by the subject. With our patient the results are only conclusive insofar as they were obtained with objects correctly identified and named by him at the time of the test. Our discussion is limited to such results.

Since the patient never had mastered English writing, the writing tests were done with Italian words only. We chose for this purpose the words contained in store accounts written by Lanuti himself previous to his disease, which we were fortunate in securing. All words which in the patient's accounts had been spelled correctly, were now grossly misspelled by him, both in spontaneous writing and in writing to dictation. *Latte* (milk) appeared as tolnete, *cipolla* (onion) as polici. In copying the words written in script and in transcribing print to script Lanuti still made errors, although less gross ones. Correct results were achieved only when he copied print, which he did mechanically, stroke by stroke, not really attempting to write words but merely copying the design.

To test the automatized writing the patient was frequently asked to write his own name. His performance was never correct, the best version he ever gave of Francesco being Feresco, and with time more and more letters were dropped or replaced by wrong ones.

The formation of the letters was very poor, and occasionally superfluous strokes were made. The whole task of writing was at all times a difficult one for the patient. He loved, however, to play at writing much in the same way as children do who have not yet learned to write. He would cover whole sheets of paper with meaningless rhythmic scribbling, maintaining that they were letters to his family or friends.

Since it was known that Lanuti used to read headlines (but not the text) of English newspapers, both English and Italian words were used in reading tests. He was asked to read words printed on cards, and to read words written by himself. In another test series he was given cards bearing names of objects, one at a time and was asked to choose from among four or five objects spread in front of him one named on the card. In the reversed task the objects were presented one by one, and the card bearing the name of that object had to be selected from among four or five cards spread on the table.

On the whole, the patient's reading in all these tests was grossly defective, but showed evidence of recognition of at least part of the words. He read matches as natches, ball as pall, pencil as fachil, and pipe as potats (his word for potatoes). In reading his own earlier handwritten accounts he misread: *latte* as dotte, *cipolla* as sopol, *pane* as fanne, *uovo* as *uomo,* only the last of these substitutions being a meaningful word. He benefited less than might have been expected from the presence of the objects the names of which he had to read, reading, e.g., *uovo* consistently as *uomo* and pointing to himself as "*uomo*—me!" even when an egg was on the table in front of him. In this instance the predominance of the more personal over the less important content may account for the

error, but this explanation does not hold for other wrong choices, such as those of onions, milk and egg in response to the card bearing the word *pane* (bread). Only the response to *latte* (milk) was always prompt and correct. In the reversed situation of choosing a card for the objects shown, the patient's choices were invariably wrong.

The experiments with reading were conducted over a period of a few weeks, and within this period a certain change was noted in Lanuti's behavior in the test. When first confronted with the request to read, he attempted to name each single letter, trying very hard and getting some of the letters correctly. Soon, however, with the examiner's encouragement, he started reading words as wholes, with the results that were given above. When he was confronted with a longer text in Italian he started by reading letters and parts of words, then very soon changed to reading single words picked out from the text here and there, and finally passed to 'reading' whole sentences and paragraphs. As he changed from smaller to larger units, the speed and fluency of reading increased, but the correctness of it decreased in the same measure. Whereas parts of words were read correctly, the sentences produced by Lanuti were nothing but confabulations having hardly any relation to the text in front of him. His reading at this stage reminded one strongly of the make-believe reading of a three- to four-year-old child. At the same time Lanuti's attitude towards the task changed markedly. At the beginning he obviously worked hard, was rather uncertain about the results and was frequently puzzled and depressed by his failures. The reading in that phase was a laborious and disheartening task never enthusiastically undertaken. Once he slapped his head with the book he was attempting to read and said dejectedly: "No good". Yet, as Lanuti passed, in the course of reading the Italian text, from the halfway successful though meaningless reading of single words to the frankly confabulatory paragraph reading, he completely relaxed, seemed to enjoy his performance greatly, and only with difficulty could be made to stop. The contrast here was much the same as that between real writing and playful scribbling. This change of emotional tone is interesting because it reflects a general trend in the patient's gradual change of attitude. Faced with tasks that he could not possibly solve well, he showed a tendency to abandon attempts at real achievement in favor of the world of phantasy and imagination. Since reading was one of the difficult tasks that gave little chance for a feeling of success and on the other hand offered an easy transition to a phantastic solution, it readily took this course. Very soon the confabulatory responses completely replaced all earnest attempts at reading, so that it was impossible to repeat the reading tests at a later period of the patient's hospitalization.

3. USE OF NUMBERS

A thorough analysis of the complex field of numerical operations would have required extensive and varied investigations. Since it was not possible to carry out such investigations with our patient one can only mention outstanding phenomena which probably raise more questions than they answer. We shall start with the patient's appreciation of written numbers, a function closely related to reading and writing.

When Lanuti was shown cards with

simple digits written on them, he named 1 and 4 correctly and rather securely. His responses to other one-digit figures, however, were very uncertain and faulty. The figure 2 was frequently read as 3, 3 as 2, 5 as 3, 6 as 5 and 9. Errors of the same type occurred also when the situation was reversed and Lanuti was asked to write down a number called by the examiner or to choose a card bearing that number from six cards spread in front of him. Even in merely copying figures, Lanuti used 2, 3, and 5 interchangeably, while copying correctly 1 and 4. It seems likely that he confused the rounded figures with each other because of the general similarity of their shapes, while recognizing the two rectilinear figures.

The responses of the patient, whether right or wrong, were always preceded by counting of fingers. For instance, when told to write down 5, he would whisper the word, spread the fingers of one hand, look at them, write down a figure and presenting it to the examiner show her the spread fingers and say "five". Apparently the simple connections between the word and the written figure did not work, and the patient tried through this recurrence to a concrete five to make sense of the otherwise empty and incomprehensible sound. Yet even if the correct number of fingers was shown this did not secure the writing of the correct figure. Thus asked to show five fingers Lanuti did so, but wrote down 6.

It may be noted in passing that in the tests of telling time by the clock, or setting it to oral or written command, the patient seemed capable of a somewhat better appreciation of written numbers, possibly recognizing their characteristic positions on the dial. However, he lacked the understanding of the functional relationship of the two hands, and usually considered only the position of the big hand, so that each exact hour was read as twelve o'clock, etc.

The results of all tests with written numbers show conclusively that for the patient they have no firm connection either with the heard or spoken word expressing number, or with any actual quantity. When he writes down, e.g., the figure 3, we do not know whether he means 2, 3, or 5, or whether he means anything at all. Therefore no conclusions about his abilities in this field can be drawn from operations done in writing, and we shall concentrate in further discussions on operations carried out orally.

We shall first consider the patient's appreciation of seen manifolds. A normal adult, if presented with a number of objects and asked how many there are, solves this problem in one of two ways, depending on the number presented. Within certain limits the number of units appearing simultaneously in the visual field may be immediately perceived much in the same way as the size or shape of the whole configuration. Thus we can see right away that there are three birds in a cage, four oranges on the plate, and even in much larger manifolds the numbers can be directly perceived if the units are ordered in configurations such as the groups of dots on dominoes or playing cards. If the manifolds are still larger, the exact number can be only found through the process of counting. The result obtained through the latter method is not actually perceived by the person, but if he has mastered the principles of our number system it is meaningful to him since it is characterized by a definite position within this system. A further distinct characteristic of a normal adult's number

concept is its abstractness; a number even if exemplified by a concrete manifold is clearly understood to be a relational category applicable to any manifold, regardless of what kind of objects it is made up of. Studies by various investigators have shown that such an abstract conception of number is a result of a long development and is not present in young children and in some primitive peoples (45, 46).

To test the patient's appreciation of numbers in seen manifolds the examiners had him tell the number of spools which were either placed on the table in a line or arranged in various configurations. The patient was also asked to give the examiner a specified number of spools taking them from among a large number on the table, and to show a specified number of fingers.

It was quite surprising to see that the patient seemed to have no immediate perception of numbers in manifolds. Even when only 2, 3, or 4 spools were placed in front of him he never picked up the required number off-hand. The spools in each group had to be counted laboriously, and even if they were arranged in a triangle or a square, this made no difference in his procedure. In spite of this there was a great difference in his appreciation of manifolds containing up to three objects and of all larger manifolds. One gained a distinct impression that in the first case, and in the first case only, something happened during the process of counting itself: the number aspect of the configuration became perceptually predominant, and a certain insight seemed to be achieved by the patient. He gave the result of his counting in a tone of astonished and excited recognition, and often accompanied his answer by an action expressive of oneness or duality: e.g., he raised the corresponding number of fingers, or took the two spools in his two hands, or organized the three spools into a pair and a single spool. This discovery of the number aspect of the configuration in the process of counting was very similar to the discovery of the nature of an object in the process of seeing it function: the fulfilment experience was unmistakably present here. Whenever these signs of genuine recognition were present the answers given were correct. This was always the case with 1 and 2 spools, whereas with 3 there were occasional uncertainties and mistakes.

Another striking feature of Lanuti's dealing with small numbers was that no question about them was ever answered by him on the basis of simple knowledge readily available to normal people. We refer to his previously described efforts to find out through careful counting the number of his own ears, eyes, noses, legs, fingers on one hand, etc. This phenomenon might be related to the disturbance of the body schema, but it is not limited to this sphere, since Lanuti displayed the same behavior when asked, e.g., about the number of legs of a table. It is interesting to note that on two or three occasions when the patient drew spontaneously a picture of a dog, he gave it the correct number of legs and ears, and that in his favorite picture of a man two eyes were usually drawn. It might appear paradoxical that the patient should have the necessary knowledge of numbers when drawing and not have it when he had to express it in words. However, it would be misleading to assume that the process was the same in both cases and that only the means of expressing his knowledge were different. In drawing the patient probably never

asked himself expressly the question about numbers—he was simply reproducing a concrete entity, a qualitative configuration, containing similar parts, in which the numbers did not stand out as such, however. The question "how many", on the other hand, represents a demand for an abstraction of the number aspect of a concrete manifold, a task which the patient could not fulfil. Therefore he had to resort to actual counting of objects.

With numbers above three all certainty was lacking in the patient's answers and usually they were faulty. Among the conditions that must be fulfilled for correct counting of larger groups of objects are the following. First, the memory for the number series must be intact: the subject must be able to say the numbers in the correct sequence. Second, in counting the objects he must make the pronounced numbers tally with the objects. Third, he must understand that the number assigned to the last object counted is at the same time the result, representing the manifold in question. Observations of children show that they may be able to go through the motions of counting without realizing the meaning of the process. A child, after just having counted his five fingers correctly, may be unable to answer the question about the number of his fingers.

None of these three prerequisites of successful counting were fulfilled in the case of our patient. When he was made to say the number series he started correctly, but soon began skipping or repeating numbers. In one of his best performances, e.g., he skipped 4, 9, 13, 14, 17; 19 was followed by 24, 35 by 45, and although the teens were named in correct succession, the digits were never gone through correctly. Writing the number series and arranging numbers on cards in proper order yielded even poorer results than did oral recitation of the number series.

The second difficulty was met with in the process of counting real objects. It was not uncommon for the patient to count a space between two objects, or to count the same—usually the last object—twice. These errors were obvious to the examiner because Lanuti usually, in counting the objects, touched them with his finger. Difficulties of this nature were especially pronounced in counting the fingers themselves. Frequently he would count an extra number in the space between the index and the thumb. He also had a hard time separating the fingers to be counted from the rest. When asked to show 9 fingers, he would count off 10, merely because he was unable to keep the 10th apart from the others. In trying to move and bend the fingers he took recourse to methods such as bending the thumb by pressing it against the table, grasping and holding with one hand the fingers of the other hand, etc. Once, becoming altogether confused by his failure to hold the fingers separated for counting, he suddenly placed his hand on paper, traced its outline with a pencil, and counted the fingers on the picture instead of on his hand.

Other errors made by the patient occurred usually towards the end of a series, and consisted largely in what one might call overshooting the mark. In counting 5 objects, e.g., Lanuti would count: 1 2 3 4 5—6, pausing before the last number and then shouting it impulsively; in counting 9 objects he would count: 1 2 3 4 5 6 7 8—9 10, pausing before the last two numbers. Occasionally there was just a sudden stopping and a skipping of a number before the

end: 1 2 3 4–6. In other instances, upon arriving at the end of a row of spools, Lanuti would continue saying the number series, touching the spools now in the reverse order, from right to left. All these disturbances can be explained if one assumes that the patient does not really count as normal people do, i.e., with the conscious purpose of finding out how many objects are in front of him. His activity is just that of saying numbers while touching objects—he has no insight into the meaning of this connection. Since the activity of saying the number series is in itself a continuous and automatized one, the end of a row of objects which puts a sudden end to this activity comes as a shock to the patient (32, 48). He is suddenly faced with a void, with a lack of concrete support for the continuation of counting. Thus the approach of the end of the series, instead of signifying a meaningful conclusion of a task, assumes the character of a catastrophe for the patient, and as a result even the mechanical performance of counting becomes disturbed towards the end of the series. This interpretation is borne out by the emotional behavior of Lanuti at the moment of stopping. He frequently shouted the last number in an explosive fashion, staring at the examiner with an expression of actual fright. This behavior at the end contrasted strongly with his quiet absorption in the process of 'counting' at the rest of the series.

Whatever explanation one gives to end-disturbances, they contributed to making the patient's counting above three extremely faulty and confused. The result of his counting was usually a higher number than it should have been, due to the skipping of numbers and to the 'overshooting the mark'. Subjectively, Lanuti was very uncertain in his answers and frequently seemed to suspect that they were wrong, counting most series two or three times in succession. At the same time his errors stubbornly defied correction, and all attempts to retrain him in counting remained without success.

Since counting is the basis of all arithmetical operations, we cannot expect much from the patient's performance in arithmetic. That he had some notions about the processes of adding and subtracting—the only operations tested—may be inferred from the fact that his 'sums' were usually larger than either of the numbers added, and his 'remainders' smaller than the minuends. Yet he never gave a prompt reply even to the simplest problems, such as 1 + 1. Each had to be figured out, and the method used by Lanuti practically without exception was counting on his own fingers. Since he always used his right hand for the actual counting (touching) of the fingers, his operations were limited to the fingers of one hand. When numbers higher than five had to be added he continued counting on the fingers of his left hand, either touching them now in the reverse order, or starting again with the little finger.

Just how he went about adding and subtracting did not become clear to the observers. He never kept separate the two units to be added, but apparently tried to add and count the fingers at the same time; there was no way of telling what cues ever made him stop in the process of counting. Even if he had been adding correctly, the errors occurring in his counting as such—the skipping of numbers, the difficulties in separating the fingers for counting—would have been sufficient to distort the results of all his operations, usually making them higher than they should have been. The patient was actually completely confused

by the task; he would go through each operation repeatedly and still be very uncertain in his answers.

Against the background of these futile efforts and general confusion, the few genuine solutions stood out as points of clarity and were a source of great satisfaction for the patient. When, for instance, he was asked to add 1 and 1, he frowned, raised his thumb, then his index finger, looked from one to another, said: one—two, and then impulsively held them toward the examiner saying triumphantly: "two". Correct solutions were achieved only when one of the numbers was one, i.e., in such tasks as $1 + 2$, $3 + 1$, $2 - 1$, and not always even in those.

When addition and subtraction problems were offered in writing the patient attacked them eagerly, but since the written numbers were another source of confusion, and since his procedure was even less clear than in oral tasks, the results are difficult to analyze. Fingers were again used for computation. The numbers that had to be carried over were written down in the sum which completely upset the results. Desire for achievement as well as feelings of confusion and failure were strongly in evidence. Presenting a result Lanuti would ask anxiously: "Good? No good?", and when left alone in the room he was observed through a one-way screen to moan and beat his head in despair as he was laboring over a problem. This type of task was familiar to the patient from his former occupation. He was known to have been very accurate in keeping his accounts. Therefore the failure must have been felt by him especially acutely. It must be said that all arithmetical tests were given to the patient during the first period of his hospitalization, when aspiration for achievement was still strong and the work attitude very good. At no later period was it possible to make the patient spend so much effort at the tasks involving numbers, and therefore the tests could not be repeated.

From our knowledge of the patient's performances in other fields we assumed that arithmetical operations might be facilitated for him by being made part of a concrete familiar situation. We attempted therefore to play store with him. Although protesting at first that he saw no store, Lanuti was soon drawn into the situation and took turns with the examiner in selling and buying various objects placed on the table in front of him. The examiner's purpose was to see whether in paying and in giving change he would handle money correctly, but this plan failed because of Lanuti's complete disregard of the first principles of trading. Although fixing exorbitant prices on his merchandise (a dollar for matches, ten dollars for a lemon), he actually took any sum he was given and when asked for change would simply give away all the money he had, including even that just received in payment for the object sold. In the role of a customer he would pay with any coin he happened to look at, regardless of the price required, and if he thought the 'salesman' was dissatisfied with the payment he was always willing to give him all he had. The meaning of the game for him was apparently that of giving and taking, and he could not be induced to engage in any arithmetical operations with the money at his disposal. The only conclusion that could be drawn from this experiment was that Lanuti had lost all knowledge of the monetary values both of objects and of coins and tended to exaggerate them, calling, e.g., a penny five cents, a quarter fifty cents, and a dollar bill ten dollars. This tend-

ency is probably an expression of a manic trend which was unmistakable in the patient. When asked about the number of sheep and cows on 'his farm' he would boastfully speak of thousands of them; would offer the examiner a check for a million dollars, or an apple that weighed "hundred pounds" and had to be pulled by a "team of horses". Obviously these numbers represented not any definite quantities, but emotionally colored equivalents of 'a lot', 'no end', etc., and have to be evaluated as such.

In attempting to analyze our findings it may be helpful to discuss Werner's (45) description of the development of number concepts. He distinguishes the following four levels of increasing abstraction of the number.

1. Level of *qualitative configurations* where the number does not stand out as such, e.g., 'a herd', or 'a family'.

2. Level of concrete *number-configurations* such as the hand with five fingers, or groups of dots on dominoes.

3. Level of concrete *number-schemata,* such as body number schemes (fingers), or optical schemata (e.g., tallies in a row). Whereas the number configurations only serve to visualize a definite number, the number-schemata are constructed for the primary purpose of counting and, within limits, can be used for a variety of arithmetical operations.

4. Level of *abstract number concepts* where no concrete perceptual support is necessary for dealing with quantities.

In attempting to determine the level reached by our patient we may assume that he may, to a certain extent, experience the concrete number-configurations. However, the scope of these experiences is limited, and they appear only after the action of counting has taken place. Under these conditions, and only then, the one, the pair, and the triad are distinct and vivid experiences for the patient. With all numbers beyond three he attempts to deal on what at first glance seems to be the level of concrete schemata, the hand being used as the counting schema. However, his lack of success proves that this level is beyond his reach.[14] Observation of his behavior shows that his finger schema never approaches even a primitive number system, and is tied up very closely with action and with the concrete objects making it up. In counting his fingers Lanuti always touched them with the other hand, and occasionally he was seen to match the objects counted with his fingers, putting, e.g., a finger on each of the three of four spools counted. When he had counted the fingers on one hand, and then was asked how many he had on the other hand, or how many the examiner had on her hand, he could not answer without actually counting them. When he was first given the task of writing down a certain number which he had just counted on his fingers, his first thought was to put his hand on the paper and to outline the fingers counted: so little could the number be separated from the objects counted. From all these observations we may conclude that the patient's experience with numbers is far removed not only from the level of abstract number concepts, but even from that of concrete number schemata.

Knowing the patient's meager education one might question whether he had ever been in possession of abstract number concepts. The readiness with which he resorted to using his fingers for counting in our tests makes one suspect that this was a familiar method. It is possible

[14] Close relationship between the intact finger schema and the arithmetical ability has been demonstrated both in brain lesion cases and in feeble-minded children (9, 41).

that the numbers had never been purely abstract signs for him and that in his operations he had always resorted to certain objective representations, and had never operated with mere symbols. This might explain why the mechanical connections such as those of the multiplication tables, which are formed as a result of verbal operations with numbers, were so conspicuously absent in our patient. Certain brain-injured subjects described in the literature, after having lost the abstract idea of numbers, were still able for a while to perform some familiar mechanized procedures, even though the words were not concepts for them any longer (14). They simulated a higher level of understanding than they really possessed, living, as it were, from the capital accumulated before. Our patient, on the other hand, possibly never had formed such mechanical connections between number symbols, and was at a disadvantage in using them after he had lost whatever schematic concepts of numbers he had had. His poor achievement therefore clearly reflected the extremely primitive level of his actual thinking.[15]

4. SUMMARY

If by symbolic function we understand merely the ability to connect objects with certain signs and to use the latter in relation to the first, then one could say that this function is not impaired in the patient. He can use words adequately under certain conditions, numbers within narrow limits are used in relation to groups of objects, and although reading and writing, which were never fully mastered, are grossly impaired, the activity of representing objects by written signs is not completely strange to him. In spite of this, his operations with symbols are extremely limited in scope and mostly grossly defective. The disturbances are many and originate at different levels of performance.

In the first place the symbols themselves are perceptual units and as such subject to the same difficulties of recognition that the patient encounters in his dealings with other objects and spatial patterns. Letters, words, and written numbers may or may not be recognized correctly, with the result that the patient is deprived of the very tools for adequate reading, writing and arithmetical computations.

Secondly, the patient fails to grasp the symbols that are meant to represent abstract relationships. Thus, the number system serves to represent the relationships of quantity, and cannot be mastered unless these relationships themselves are grasped. Since explicit understanding of complex and abstract relationships is quite beyond the scope of the patient, the number system as such does not exist for him. Numbers representing higher quantities which cannot be visualized remain meaningless sounds or shapes for the patient and no operations with them are possible.

Lastly, the patient fails when the symbols, even though they stand for concrete objects, have no immediate relation to the actual situation and require for their adequate appreciation and use a detachment, an abstraction from this situation. Thus, although the use of spoken language is not impaired as such, Lanuti is unable to understand any statement that does not refer to the situation at hand, unable even to understand a

[15] There is just a bare possibility that the mechanical connections in question would have functioned better in the patient's native tongue in which they were first acquired and automatized. However, Lanuti himself spontaneously used English in his dealings with numbers, and no systematic investigations were done with numbers in Italian.

simple story as such, to say nothing of statements dealing with generalizations, abstractions or figurative meanings. His understanding and use of language is fully as much dependent on the situation as is his recognition of objects: without the situational support, words and objects alike are for him merely shifting patterns of sounds or colors. Thus the use of language as a means of operating at will with non-present or even non-existing things is closed to the patient. If the ability to realize the meaning of signs in absence of the objects to which they refer is considered an integral part of symbolic function, then this function is, indeed, severely impaired in the patient.

One peculiarity of the patient has served to accentuate his defects in operating with symbols and to show them in bold relief. The educational level of the patient was very low, his English extremely poor, and his experience in reading and writing probably very limited. Thus, these activities have never reached the degree of routinization and automatization typical for persons of average or higher education. The well automatized verbal performances are sometimes found to be preserved for a relatively long time in cases of brain injury, and sometimes patients are able to utilize them for performing tasks the structure and meaning of which they no longer appreciate. Our patient, however, did not possess verbal automatisms that would be strong enough to resist disintegration. Thus, his defect could not be hidden by the use of routinized methods of dealing with symbols and was manifested in its real and striking dimensions.

VI. Memory

The discussion of the patient's performance in various fields has already made apparent certain aspects of his memory defect. In particular the failure of the function of recognition was manifest in the patient's difficulties in identifying objects, people, places and signs, such as letters, words, numbers. The structure of this defect was analyzed in the preceding chapters. In the present chapter we shall discuss the recall of past events, and shall try to show the conditions under which recall does take place, or—more strikingly and frequently—fails to appear.

We shall first deal with the material contained in the hospital records of the psychiatric interviews which provide a good source for judging the patient's memory for remote events. We find in these records that questions about the place of his birth, his parents, his education, his work and earnings, his family status, etc., were usually answered by a puzzled "I don't know", or by a bewildered silent staring. He gave his first name correctly, but once, when asked about his last name, scratched his head saying "last name, last name", remained silent for a few minutes and then repeatedly struck his head with his fist. He was unable to recall the names of his wife and his daughter, and on many occasions did not even seem to know whether or not he was married and had children. Occasionally, however, he gave evidence of a better knowledge of his past, e.g., by mentioning his wife in a conversation. On other occasions he gave prompt but incorrect replies to the same questions. He said on different occasions, that he was born in Rome, or in Genoa, that he was 25 years old, that he had two or four, or five children, that he had worked in South America, that he was a farmer, that he had two millions in a Boston bank. Altogether the failure of recall appeared so extreme, the phantastic elements in some of his answers so strong, and the inconsistencies of performance so obvious, that the results of these interviews were considered by some examiners as evidence of malingering. The observations made during our study helped to clarify this apparently inconsistent and confused picture.

In the course of the experimental sessions the examiners frequently asked the patient about recent events, such as his work, change of ward, visits of relatives, happenings and conversations during the previous testing sessions. Most frequently these questions were met by Lanuti with puzzlement and silence. His failure to reproduce even the most recent events was striking. Once, before entering the testing room Lanuti took off his mud-covered shoes and left them outside the door. Half an hour later when he was preparing to leave, the examiner called his attention to the fact that he had no shoes on. He searched the room for them, then suggested that they were downstairs, and walked out of the room without even glancing at them. During another session he took a fancy to a jar of paste which he had just used, and put it in his pocket declaring that he would take it with him to "fix things". When five minutes later he was induced by the examiner to search his pockets and discovered the jar, he asked in astonishment: "Who put it there?" On hearing that he himself did it he was quite upset and said: "Oh gee, no good, me steal box", and started looking in his pocket for whatever else he might have "stolen". This did not remain an isolated

episode. Whenever one induced the patient to put something in his pocket, and then to continue his former activity, one could rely on his going through the same puzzled discovery when questioned about the content of his pockets a few minutes later. The length of time elapsed did not seem to be a significant factor in these failures: occasionally it was practically nil. Once, when the patient looking out of the window was engrossed in talking threateningly to an imaginary man (see Ch. VIII), the examiner interrupted to ask to whom he was talking. At the sound of her voice Lanuti was startled and turned around looking bewildered. When the question was repeated he did not even seem to understand to what it referred maintaining that he had not been talking at all.[16]

It is likely that the condition contributing to the conspicuous failure of recall in all these cases was not the time elapsed, but rather a lack of continuity between the episode and the situation that followed it. The patient can be only in one situation at a time. Whenever one episode is completed or interrupted and succeeded by a different situation, it disappears from his life space and cannot be recaptured at will. Probably all factors that detract from continuity between the two situations—their irrelevance to each other, abruptness of change—contribute to the production of these failures of recall.

To illustrate the factors that favor recall we shall give a few examples of successful reproduction—or rather of reenactment—of past events.

While going with the examiner through the ward Lanuti entered a room in which two men were sitting and said: "See men here. Evening many men, hundred, hundred men come and smoke". The room was actually used as a smoking room by the patients after working hours.

Lanuti was induced to play ball with the two examiners. After a while he told spontaneously how he had played with other patients on the farm using a squash for a ball. He acted out the whole scene showing by gestures how heavy the squash was, how one man got hurt in his knee and how he limped as he went to the hospital. The episode was verified by another patient as having occurred three days before.

The examiner asked Lanuti how he liked to eat in the cafeteria, trying to make him describe the procedure, but at first obtained no response beyond the indifferent stereotyped "good". She then asked whether he did not have to stand in a long line to get his food. Lanuti suddenly became animated, exclaimed "Yes!" and started telling and showing by gestures how he stands in line holding his tray, how the man in white puts food on his plate, how he walks around, finds a free place, sits down, eats, and leaves. His pantomime was a correct reproduction of the actual procedure in the cafeteria.

One morning the patient, for the first time after a month, was given a sedative which he called candy. In the afternoon, in the laboratory when asked whether he got any candy today, he at first denied it, asking: "where?" with a puzzled and tense expression. When the examiner said: "downstairs" and talked about the little white candy, he suddenly shouted in great excitement: "Yes, yes, I know" and proceeded to act out the whole scene of taking pills: "Lady says—open mouth". He opened his mouth wide, then acted out very vividly how the nurse makes him take a drink and looks into his mouth to see if he had swallowed the pill. The change from bewildered silence to an animated joyful performance was striking and quite analogous to the 'clicking' observed at the moment of recognition of a previously unrecognized object.

These examples were chosen from instances of recall of recent events because only such events could be easily verified

[16] Since the patient always talked freely about his hallucinatory experiences, his failure to recall the episode cannot be interpreted as dissimulation which, in any case, would have been quite outside his scope.

by the examiner. On many occasions, however, the patient acted out very convincingly scenes pertaining to the running of his grocery store or even to earlier periods of his life, such as his military service in Italy. Whereas it cannot be determined whether these reproductions referred to single episodes or to routinely recurring situations, or how exact they were, they are sufficient proof that recency was not the necessary condition of recall. On the other hand the instances of verified correct recall have one feature in common: the occasion for recall was not a mere abstract question put by itself without any context. In the first two instances the recall was spontaneous and was produced by an actual situation that was a part of, or similar to the situation recalled: smoking room, ball game. In the last two instances isolated questions failed to produce recall, but when the examiner, by giving details about the situation to be recalled, made it vivid for the patient, the response was surprisingly adequate. We may conclude that in order to make the patient recall a situation one must, paradoxically speaking, place him in this situation. A mere isolated question seldom has this effect—the situation must be actualized through action or concrete description. If this is achieved, if the examiner happens to strike significant elements of the situation, the patient suddenly finds himself in this situation—and starts acting it out: he completes the offered fragment to an action-whole.

We may conclude from the foregoing discussion that the patient is able to retain at least some of the situations that he had experienced. The abnormal changes demonstrated in these examples concern the conditions under which these memories become available. The two outstanding findings pertain to the role of discontinuity in causing forgetting and the necessity of a concrete situational stimulus for producing recall. These two factors, however, are closely related. Discontinuity, interruption, means destruction of a given concrete situation, a change to a different actuality, with no bridge left between the two that would enable the patient to retrace his steps at a later time. To illustrate, when Lanuti is induced to search his pockets, this situation has nothing to do with that of wanting to "fix things" which led to his pocketing of the paste jar a few minutes earlier. This object now appears meaningless, it does not belong to the situation, should not be there—a feeling reflected in the patient's remark "me steal box"—and, lacking situational support, it fails to bring to the patient's mind the former episode. The failure of recall in this case depends on the discreteness of the two situations which makes impossible a concrete transition from one to the other. While the momentary situation prevails the former one cannot be actualized.

The strong prevalence of the momentary situation shows itself no less clearly in cases of successful reproduction of past events. In describing such cases above we said that the patient starts *acting* out the past situation. This choice of term is suggested not only by the strong participation of gestures and actions in Lanuti's performance: it is doubtful whether one may say that he starts recalling or describing the situation, because he completely lacks the detachment that is implied in the latter processes. His attitude is not that of a normal person who in relating past events clearly differentiates them from the actual present, and is aware of the relative positions of the two in time. The

patient, in the laboratory, in talking to the observers, has difficulties in recalling the cafeteria situation, because he is altogether absorbed by the momentary real situation. When the cafeteria situation becomes actual for him, the present situation seems almost to disappear and he lives in the situation recalled. Psychologically this is now the actual situation for him, and his actions are determined by it nearly as fully as they were by the real situation a minute ago.

As a consequence of this strong predominance of the actualized situation, it is deprived almost completely of the character of a past event. If the examiner asks when the re-enacted episode took place, the patient either disregards the question completely, or stops his performance looking bewildered and lost. His spontaneous speech contained hardly any references to time, and the few that occurred—such as yesterday, a month, or a year ago—had no discernible relation to reality and seemed to express at best a general vague feeling of the situation not being quite real, of its having gone, much in the same way as the words "over there" and the gesture in the direction of the window was resorted to in talking about any absent person or object. Probably this vague feeling of incomplete reality, incomplete fulfilment of a situation, is basic for the only perception of the past as such that the patient has. He is even less able to relate the past to the present, to structuralize events in time, than he is able to structuralize configurations in space, to create spatial schemata of his surroundings in which single objects would have definite positions. This is probably due to the fact that sensory clues which play an important part in space perception are of little help in the appreciation of time: we can see space, whereas time is a rather abstract construction. In this connection it is significant that the patient attempted to localize past events by referring them to a locality (the farm, downstairs, over there) much more frequently than by referring them to a period of time (yesterday or today).

As a result of his inability to organize events in time, the patient lacks perception of his own personal past, lacks the continuous subjective life history, which in normal people functions as a frame of reference for recalling and placing of single events. His memory lacks organization and consists as it were of a series of flashes illuminating now the one now the other episode of his past.

It is difficult to determine in each single instance what produces such flashes of recall. In the instances analyzed above something in the real situation or in the examiner's description of a past episode had the effect of suddenly placing the patient into a past situation. If there was any conscious search for the episode mentioned, it seemed to have practically no effect. However, subjective factors doubtless play an important role in determining what episodes will be more easily reproduced. In the examples given above the episode recalled had at least a slight emotional coloring. The best achievements of the patient were found in the fields of higher emotional significance. Thus, the day after the examiner made him the present of a pipe over which he greatly rejoiced, he still remembered correctly that a woman gave it to him downstairs. In response to a question about his work on the ward, he demonstrated vividly the process of swabbing by pushing a chair around the room, and then complained about the attendant who was "kicking all the time, come on Frank, hurry up, hurry up", and did not give him any tobacco. When

somebody said in talking of Lanuti's bandaged finger that nothing much was wrong with it, the patient re-enacted scenes involving similar frequently encountered sceptical attitudes on the part of the hospital staff. The performance was accompanied by an emotional outburst against the physicians. In these last two instances the situations recalled, in addition to being strongly emotional, were also of a permanent or recurrent nature, and the reminders of his grievances—the hurting finger, the empty tobacco tin—which were constantly with him may also have facilitated the recall.

The patient's inability to recall past events at the request of others was to him a constant source of bewilderment and of strong feelings of failure. 'Lost' and 'forgot' were his most common experiences, and in the beginning of his disease they never failed to have a depressing effect on him. As time went on a certain change took place in which two trends could be distinguished. At first, questions which the patient could not answer produced bewilderment, tenseness, and a helpless "I don't know" or "forgot". Later on, routinely recurring questions were answered in a routine fashion with one or two stereotyped responses. Thus, asked what he had had for lunch or dinner Lanuti invariably answered either "potats" or "bread and coffee"; asked about his work on the farm he always replied "pick potats". Such answers were given in a lifeless tone of voice, notably different from the patient's animated responses in situations of true recall. On the other hand, when he was in a more expansive mood, the patient would give some phantastic response, talking volubly, but without any evidence of sudden 'clicking', of sudden joyful recognition typical of true recall. Once, e.g., he met an employee who stopped to greet him and asked if he remembered her. The patient answered: "Sure, I seen you in New York a month ago", and continued to talk about his imaginary trip to New York in an animated fashion. After the girl left he said to the examiner: "Girl forget me, I not forget her". It is likely that both the stereotyped answers and the tendency to confabulation represented his attempts to meet the situation with which he was unable to deal adequately, and to ward off depressive feelings produced by his failures.

Thus in the field of memory the patient displays the same characteristics as in other fields of performance. We find here the same striking dependence on the concrete situation that was obvious in his recognition of objects and people: he is unable to answer questions that are put to him in abstracto and have no relation to his momentary situation, is unable to reproduce knowledge at will, but performs vividly and adequately once he is placed in the situation and has its support. The patient's successes in recall under these conditions make it clear that the concept of an actual concrete situation must be formulated so widely as to include not only the real momentary situation, but also the past situation if and when it becomes actual to the patient. When this happens he lives and acts in the reproduced situation to the extent that the present practically disappears from his mind. In spite—or rather because—of this extremely vivid re-enactment of past events, the patient may be said to have no memory for his past comparable to that of a normal person. The evoked events have to him only the slightest—if any—coloring of the past. They cannot be localized in time, cannot be related to other events past or present, because

no other events exist at the moment. The evaluating of comparative realities of the past and present situation, the grasping of time relationships, the building up of a temporal system, all require an attitude of abstraction, of detachment from the momentary situation of which the patient is not capable. His memory provides him with no means for conscious deliberate recall and with no continuous picture of his past, but only with a number of suddenly emerging concrete episodes: he re-lives these episodes, but he can hardly be said to recall them.

VII. Experience of Values

Value experiences seemed to occupy a prominent place in the life of the patient. The expressions "good", "nice", and "no good", "bad" were used by him very frequently, and the vigorous quality of these manifestations of approval and disapproval suggested that they were based on vivid and strong experiences. We shall discuss here the value experiences that were evoked by 1. the patient's own acts and achievements, 2. social situations, and 3. objects and objective events.

The patient's own *successes and failures* in the experiments were frequently a source of positive and negative evaluations. Especially in the first period of hospitalization he often responded to failure by calling himself crazy, no good, or by beating his head with a real violence. The infrequent successes were met with outbursts of childish joy: "Good, me fix it good, me good man!" When uncertain about his performance Lanuti asked the examiner with an anxious look: "Good? . . No good?", and was very sensitive to any implication of criticism, or of praise. Once, when the examiner praised his drawings he asked her somewhat uncertainly: "Me make good pictures? . . Me go home?" Usually, however, his joy over his successes was not connected with any such expectations of reward, but seemed to follow merely from the enhancement of his self-feeling. As time went by, depressions over failures became less frequent, and positive evaluation of his activities became progressively dissociated from situations of real achievement. He would praise greatly even his faulty performances and tell boastful stories about his strength and his possessions.

Although Lanuti frequently praised himself as a "good man", the context in which such remarks occurred, showed that usually they did not express an ethical evaluation, but merely an evaluation of his powers and achievements. However, Lanuti's occasional vigorous repudiation of his strong desire for "smokes", and his protestations that he "no like fighting" indicate that rules of moral conduct did have some influence on his self-evaluation.

The patient's response to *social situations* was discussed in connection with his recognition of people and scenes (p. 11). It was pointed out that he showed a prompt and 'correct' response to simple self-evident social situations, especially if he was actively approached by others, but failed completely to participate in more 'complex' situations which were beyond his understanding. Here we shall try to determine which aspects of social situations aroused positive and negative value experiences in him. The discussion will not be limited to instances of explicit verbal evaluations: the implicit evaluation of social situations, their acceptance or rejection as expressed in the patient's behavior will be also taken into account.

Positive value experiences in the social field were most frequently aroused by helpful and friendly actions of other people toward the patient. His response to offers of help or of presents was always positive and animated. Thus in response to the present of a pipe, Lanuti thanked the examiner heartily, then promptly produced an apple from his pocket and presented it to her. On seeing a patient who was his regular guide on the route to the cafeteria, Lanuti told the observers very appreciatively that "this fellow wait for me, he my friend".

In his phantasy stories friends who gave him something, or wrote letters asking him to come, figured prominently. A mere amiable greeting, a handshake, in fact any manifestation of friendliness that was sufficiently expressive, readily evoked a positive response from the patient, and he would exuberantly praise such people as nice fellows, friends, etc. If a person's action was at variance with his attitude as physiognomically perceived by the patient, it was frequently the latter that determined the patient's response. Thus, after Lanuti was refused a form-board which he had wanted to take along with him, he at first looked troubled, but when the examiner asked solicitously whether he minded much, his expression brightened, and answering with an energetic "no", he readily agreed that he could come back later to play with the form-board. In general, if the setting of the social situation was a friendly one, Lanuti responded positively even to single frustrating experiences. On one occasion he refused to leave the testing room at lunch time, declaring that he "no care eat, want to play". When the observers pointed out that they themselves wanted to eat Lanuti became thoughtful for a few seconds and then declared: "No go eat, to-morrow send eat over here". Highly pleased with this solution he left the room without further objections. On another occasion, while taking the patient for a walk, the observers mentioned that they were tired and unable to follow him. Lanuti immediately picked up a big branch from the ground, profferred one end to the observers and started pulling both of them uphill in tow. Thus, when the reasons of others for denying his wishes were within his grasp, they seemed to become part of the situation to him, and his own actions were modified accordingly. He was, in fact, quite at the mercy of the momentary social situation, e.g., he could be relied upon to give away at any time any of his personal belongings in response to the observer praising this article.

The patient's ready response to friendliness and to wishes of others made him relatively easy to manage, even when it was necessary to deny his wishes. As a result he enjoyed the reputation of being a 'good patient' among the attendants and nurses of the hospital.

Negative emotional attitudes were aroused in the patient by unfriendly actions, such as refusal of help, or of a present, or repeated unfriendly criticism. Thus, the boy in the story (pp. 35-36) was reproved as a "bad boy" because he "no give no candy" to the patient. The emotional reaction to such frustrations usually took the form of resignation or of mild depression, and seldom produced irritation. If a patient whom Lanuti had asked about the way to the cafeteria remained motionless and silent, Lanuti would shrug his shoulders and state with some annoyance: "No good". Outbreaks of anger were observed in a few situations, in which severe frustration at the hand of others was accompanied by an expression of inimical or slighting attitude towards the patient, such as harsh reproof or ridicule. Even in such situations, however, Lanuti's response was limited to swearing and to pugnacious gestures: he did not attempt actual violence, although his phantasies and hallucinations contained many violent scenes of fighting.

Positive and negative evaluations of social situations were not limited to situations involving the patient's own weal and woe. It is true, that he remained indifferent to most of the happenings around him, but if a

sufficiently simple and vivid social situation was thrust upon him, his response was as strong as when he himself was involved, and was essentially of the same nature. Thus he entered fully into pictorially represented social scenes (pp. 10-11) rejoicing in those picturing positive emotions and cheerful happenings and dismissing vehemently as "no good pictures" the ones representing negative emotions and aggressive actions. The personages—people and animals alike—were either spoken to encouragingly and praised as good and nice, or admonished and reproved for their actions. When the two observers once pretended to fight in Lanuti's presence, he paid no attention until they moved into his closest vicinity; then he moved away mumbling something about their "dancing". Yet, in spite of this interpretation of the action as harmless he was obviously ill at ease and insisted on leaving the room. On many other occasions his dislike of aggression clearly manifested itself.

The nature of the patient's social responses seems to be consistent with his premorbid personality. He was always known as a good-natured and peaceful man, an easy victim of exploitation, who could occasionally be aroused to noisy but harmless manifestations of anger. In spite of this consistency, the patient cannot be said to have preserved his social attitudes at all. His social reactions depend entirely on the momentary situations—on the expressed attitudes and actions of others. In absence of such situations he cannot at will actualize or recall his feelings for another person, which makes it difficult to speak of any constant bonds between him and others. Although Lanuti was an object of affection for many of the employees, who liked him much as they would a child, he himself could not be said to have any affection for any of them: even the frequently evoked positive reactions to certain people remained just so many episodes and did not become consolidated into a constant attitude independent of the momentary situation. Such an attitude would imply some degree of awareness that the person in question was in general well disposed towards the patient. If one recalls that Lanuti was not even able to recognize the people whom he saw daily, it will be clear that he lacked all basis for such generalizations about them.

The inability of the patient to maintain any constant bonds with people, independently of their initiative and their momentary behavior towards him, was reflected clearly in his relationship with his family. The relationship passed through two stages. At first, Lanuti's wife and daughter, both of very limited intelligence, were unable to understand and to accept his changed and inferior condition and were actually afraid of him. Although they visited him in the hospital and took him home for occasional visits, they were unable to communicate with him on his own level. Consequently, Lanuti had no contact with them at all, and during his visits at home stayed in a corner, thoroughly absorbed in his own phantasies. He made no spontaneous attempts to approach them and while at home never showed any signs of emotional response to social situations that he displayed under favorable circumstances in the hospital. Whereas the attitude of the wife towards the patient remained the same throughout, his daughter who was seventeen years old at the time of the accident, in the course of years changed her attitude towards her father and finally accepted him in the new role of a dependent child. She had him at home

for weeks at a time, took good care of him, and apparently succeeded in communicating with him on his own level. As a result the patient began responding to the social situations at home and felt much more at ease there than before. He did not spontaneously talk about his home while in the hospital, nor express any longing for it, but in response to specific questions he was able to recall his daughter's name and to tell or act out how she fixed his tie, took him for a walk, made him shovel snow, gave him food to eat, and forbade him to smoke. There was in all these reports a certain appreciative feeling towards the girl, whom the patient characteristically called sister. On the other hand, no questions of the observers could make him recall anything concerning his wife, not even her existence. Although he saw her no less frequently and for no shorter time than he did the 'sister', no social situations developed between them, because the wife would not take the initiative, and the patient himself could not.[17]

Very strong value experiences were produced in the patient by the *functioning of objects.* In discussing his recognition of objects we described in detail the 'fulfilment experience' that occurred when by functioning adequately the object suddenly revealed its true nature to the patient. But whether or not the act of recognition was involved, each instance of functioning of an object meant a positive value experience for Lanuti. He seemed to approach each object with a question: what does it do, what is it for? By functioning adequately the object—be it a bouncing ball, or a key in the lock—validated itself for the patient and was heartily approved and praised as good and nice. Once, on being shown a stone and having knocked it forcefully against the table, Lanuti named it correctly, but declared with a contemptuous grimace that it was "no good", "no use", and wanted to throw it away. Seeing him so upset, the observer demonstrated to him the use of the stone as a paperweight. With this his contempt was immediately transformed in great approval. He emphatically commended the stone as "good", carefully polished it with his sleeve, and in his turn repeatedly demonstrated its use to others. On other occasions lavish praise was bestowed upon a jar of paste that fixed a torn paper, or even on the pieces of a puzzle that fitted together to make a picture.

The value experiences related to objects did not seem to depend on a personal sense of achievement in producing the effect in question. Thus, when the examiner once helped the patient to unlock a door with a key he was highly pleased, but when she locked the door again—this time without his participation—he approved of this event fully as enthusiastically as of the first one. The value experience seemed to be aroused primarily by the functioning or fitting itself, and to spread also on the performing object. Only in a relatively small percentage of cases did Lanuti also praise himself as the originator of the event or inquire eagerly—as in the case

[17] We have been unable to gather any facts about the patient's sexual behavior. The hospital records contain no observations on this point. Pictures of alluring girls shown to the patient elicited no emotional response; frequently they were not even recognized as women. Although not questioned directly about sex relations, the patient's wife, in showing the observers her apartment, made a point of the fact that she gave the patient a separate room because she would have nothing to do with him; apparently he never attempted to change this state of affairs. It seems plausible that the patient is as unable to take initiative in sexual as in any other matters, which does not exclude the possibility of sexual activity, should he be brought into this situation by the partner (19).

of well behaving puzzles and form-boards—as to "who made" the nice toy.

Negative evaluations were aroused by non-functioning or poorly functioning objects. Thus, the patient once climbed into a large laundry basket, taking it for some sort of conveyance, and by shaking it and bouncing tried to make it go. Failing in this he climbed out, made a contemptuous gesture towards the basket and said with disgust: "no good". After having worked on a maze with which he had a hard time, he asked the examiner: "Who make this? Crazy fellow, no good job", and tried to show how the grooves should lead directly to the goal rather than in a roundabout way. The rejection of a useless object often took the form of actually throwing it away. Even pictures were occasionally blamed and rejected for their failure to move and to talk—to respond adequately to the patient's advances (cp. Ch. VIII).

Functioning, much as it impressed the patient, was not the only characteristic of objects that gave rise to value experiences. Lanuti could also be impressed by the *aesthetic aspects* of a situation. Passing through a small ward with the beds symmetrically arranged and covered with light spreads, or glancing into a gaily decorated room of an employee, Lanuti would suddenly stop, look intently and praise the sight as good, nodding his head with a thoughtful appreciative expression. His behavior on such occasions was totally different from his usual traffic with objects; he did not try out the beds and chairs by sitting down on them, but seemed relaxed and lost in contemplation, and it was difficult to make him leave the scene. A similar response was occasionally evoked by music. In passing by a radio on the ward Lanuti would stop and listen quietly for a long time, without sitting down; he would make slight dancing movements to some of the gayer tunes, but usually he would just nod his head and murmur to himself: "good, nice", with a pleased and quiet expression.

The patient responded emotionally not only to the harmony of objects but also their large size, power, and other awe-inspiring qualities. Once, passing through the hospital chapel which had a high vaulted ceiling, he stopped, looked at the ceiling for a while, then spread his arms imitating the vaulted shape, and said in an awed and hushed voice: "Big . . . so big . . . thous(and) feet". He remained standing in this position for a long time, with an earnest, even solemn expression on his face.

Lanuti is a Roman-Catholic in his religious affiliation, and we repeatedly observed in the course of the study that the sphere of Catholic religion was of high significance to him, and that it often determined his interpretation of objects and scenes. He was frequently taken to Sunday Mass in the hospital, but we were unable to determine whether his participation on such occasions was a purely mechanical routine performance, or was connected with any experience of religious nature. One isolated observation, however, seems to indicate that the patient was capable of such experiences. On this occasion he had to pass through the chapel, which had been set for Mass: the room was dark and only the adorned altar was illuminated. Lanuti suddenly and vehemently fell on his face before it and remained lying on the floor full length, motionless and silent, for a few minutes. Then, without raising his head, he crawled on his hands to the next row of chairs and knelt there with his face down on the chair. This performance gave the impression not of a mechanized response, but of a strong emotional par-

ticipation, quite analogous to other expressive actions of the patient.

In attempting to summarize the patient's behavior with regard to values we shall discuss the deviation of his value experiences from normal ones, first with regard to the range of objects and events producing such experiences and second with regard to the psychological nature of the experiences themselves.

The fields of values seem not to have changed conspicuously: we may assume that in his normal state the patient also used to respond in evaluative terms to his own achievements, to the actions of others, to the utilitarian and aesthetic properties of objects, and to religious objects. It is probable, however, that the patient's changed state produced shifts in emphasis among these different fields. In particular the high valuation of functioning objects is probably new, and is due to the prominent role played by action in the changed world of the patient: action in which he can participate being his point of contact with the world. We may further assume that the chaos and disorganization of the outside world frequently experienced by the patient, enhanced the value of all experiences of order and clarity. That may be the reason why even such a trivial scene as a symmetrical arrangement of well ordered beds could lead to a deeply satisfying experience of harmony.

On the other hand the defect of the patient inevitably led to a narrowing of the range of objects and events that could be evaluated. Thus, in self-evaluation, feelings of elation and depression were attached only to concrete single successes and failures, but not, e.g., to the patient's status in the hospital of which he had no appreciation. Similarly, in the social field only simple actions and expressions of people and none of their more complex behavior, were responded to valuatively.[18] Thus the patient's defect, while it enhances the value of some objects, restricts the total range of objects, relationships and events that can become carriers of value experiences.

Within the different fields of values thus restricted, the direction of evaluation seems not to have changed from the normal one: what Lanuti experiences as positive and as negative is immediately self-evident as such to the normal person. This community of valuations may be one of the reasons why so frequently normal people felt emotionally in touch with the patient; in spite of the isolating influence of his defect, from the moment when the contact was established, he was never felt by others to be queer and enigmatic as is the schizophrenic patient, whose world is closed to most observers.

We must next consider whether the value experiences of the patient, when they do occur, show any quantitative and qualitative deviations from the experiences of normal people. One obvious difference is in the intensity of the experience. The emotions displayed in the acceptance or rejection of persons, objects, or even pictures are frequently extreme and seem out of proportion with the occasion. The reason probably

[18] In the social field the limitation of the patient's evaluations to the simplest physiognomic qualities was not without its compensations. If he was unable to undertand complex actions of others in his favor or against him, he was also unable to be deceived by outward appearances, e.g., by conventional or pretended friendliness. We have noted in describing his appreciation of pictures the precision with which he distinguished good reproductions of expression from the merely conventional, unnatural ones: the first, and only the first, produced immediate adequate response. Since Lanuti was led in his response to others only by the most primitive expressive factors, he was seldom 'deceived' as to the friendliness or animosity of people who approached him.

lies in the patient's inability to deal with more than one impression at a time. The modifying and moderating influence exercised upon each mental content of a normal person by his constant awareness of the other factors of the situation is lacking in the case of the patient. His absorption in the momentary impression is practically complete, so that the emotional response to it also unfolds to its maximum, unhampered by any competing mental content.

The second deviation results more obviously from the actual lack of an attitude usually present in normal people. The value experiences of Lanuti contain no critical comparisons with standards and no conscious application of principles of evaluation, since such acts presuppose generalization as well as a certain detachment, a certain psychological distance from the evaluated objects. We may ask ourselves how important such attitudes are in the normal value experiences. Can there be an evaluation without any 'distance', one carried out in a purely concrete attitude?

This question has a particular significance in the field of aesthetic values. It has been observed that brain-injured patients are incapable of aesthetic contemplation, because the latter implies a certain isolation from the aesthetic object, an exclusion of the object from the immediate sphere of practical action. We have seen, however, that our patient did become absorbed in sights and sounds and did enjoy them without making them an object of action: obviously he was able to experience things as beautiful, harmonious, ugly, etc. On the other hand, such behavior was relatively infrequent, and the corresponding attitude could not be evoked by the patient at will. When the observers once tried to draw his attention to the beauty of a distant landscape, this only led to his rushing downhill madly, in an attempt to get to the distant 'view'. We may say that Lanuti is capable of some sort of aesthetic experience, but that this experience is thrust upon him by the situation. He is unable to assume the aesthetic attitude voluntarily, as does a normal person, or to shift at will from 'active' to the 'contemplative' attitude, and vice versa.

Summarizing we may say that the patient is capable of strong and vivid value experiences. He can experience an intensive emotional contact of positive or negative nature with objects and people, and during these contacts he acts and probably also feels much as we ourselves would in a similar situation. Yet, the differences between his experience and our own must not be overlooked. Even if we disregard the differences in the range of objects producing value experiences, as due primarily to the cognitive factors, the patient's experience appears different from ours in at least three essential and mutually related aspects. The very intensity of his emotions which contributes to our empathy is due to the characteristic narrowing down of the mind to one impression, to the exclusion of everything else. The lack of conscious elaboration and of constant standards of evaluation is a further differentiating characteristic. Finally, the strict dependence on the concrete situation holds true for value experiences as it does for all other experiences of the patient: he cannot assume or abandon the evaluative attitude consciously and at will, and only gets into it passively under certain favorable circumstances.

VIII. Reality and Phantasy

In discussing the patient's memory, we saw that he was unable to make a clear distinction between the actual present and the recalled past events. In an analogous way he was unable to distinguish reality from fiction or phantasy. In listening to stories he took them for accounts of real events—it was impossible to make him see them as fiction. In looking at pictures he would not only enter the pictured situation as if it were a real one, and talk to persons in the picture, but seemed also to expect an answer from them. Thus a little toy figure of a boy was threatened and reprimanded for being lazy and not wanting to come and get his shoe: "You no walk, no talk, no put on the shoe". Animals in pictures were treated in the same fashion. Once, unable to decide whether the represented animal was a horse or a dog, Lanuti tried to settle the question by asking the animal itself: "You dog?" Getting no answer he became worried and said: "No want talk, what is the matter, you mad? May be want to eat? You like meat?" Other human characteristics, besides talking, were occasionally ascribed to animals; thus Lanuti told a furry dog in a picture that he needed a shave and ought to go to the barber's shop.

As might be expected, Lanuti also mistook moving pictures for reality. Once, on entering the room where they were shown, he was frightened by the sight and sound of some slapstick comedy, and to all representations that those were only pictures, answered firmly: "No, people, they fight". A similar reaction was produced by his own reflection in a mirror: he swore at the "man" for not talking and for not giving him a match, and frantically searched for him behind the mirror (cp. p. 8).

Phantasy images also were not differentiated from reality. The patient frequently told about animals and people who "come to me at night". It is very likely that he was talking about his dream images, but nothing in his descriptions ever suggested that he considered them as such.

During at least one period of his illness—a period marked by great motor excitement—the patient had visual and auditory hallucinations. Most frequently he saw a man in the corner of the room or on the ceiling, and carried on many vivid conversations with him. When smoking a cigarette, e.g., he would tell the "fellow": "No, won't give you, just for me. . . . I gave you three smokes, that is enough, get away". At other times the man seemed to be tempting him with "smokes," and Lanuti rebuffed him saying: "Go away, I no want smoke all the time". In general the man seemed to be inimical and somewhat frightening to the patient, and the conversations with him consisted mostly of swearing and trying to get rid of him. When the examiners once asked Lanuti to draw a picture of the man, he produced the usual profile, but decorated it with two hornlike projections and called the picture "diavolo". It is interesting to note that the hallucination was occasionally used to explain some incomprehensible event. Once, when the patient, in a state of motor excitement, put on his head pieces of paper he had torn, and finding them a few minutes later was puzzled as to who had put them there, he promptly ascribed this act to the "fellow" on the ceiling.

The hallucinations, however, were only a small part of the phantasy life of the patient. Many of his phantasies

were stimulated by the examiner's remarks, or by pictures or objects shown to him: once the situation became actual for him, he would continue it by telling or acting out stories in which phantastic elements were mixed with his own experiences. However, the phantasying went on even in absence of any purposive stimulation: it is likely that it occupied most of the time during which Lanuti was left to his own devices and not faced with any definite tasks. The typical picture he presented at such times was that of a person oblivious of the surroundings and absorbed in his own thoughts. Frequently his ruminations were accompanied by gesturing and by talking to himself. The stereotyped repetition of one sentence, which formed the most conspicuous symptom during the initial period of hospitalization (cp. p. 2), gradually gave way to varied fragments of sentences which the patient muttered hardly audibly but expressively. Occasionally the observers managed to catch the meaning of one of these fragments and induced the patient to continue his phantasies aloud. Thus, he was frequently heard to mutter something about the North Pole. Once, when asked about it, he started telling readily and enthusiastically that "North Pole nice place, my sister there, two hours, nice place". He asked the observer to accompany him on the trip: "Want to come? Sure, come! A nice ride, leave to-night, get there to-morrow, go there every day. Was there yesterday, nice place, millions of people, soldiers, have guns, shoot, I come and fight, I fix them." Each question asked by the observer was readily utilized for the continuation of the story. For a long period of time the North Pole theme was prominent in Lanuti's phantasies. Its origin could not be ascertained, but Lanuti's stories had no specific relation to the North Pole, and occasionally Montreal or New York were substituted for it. All of these places seemed to be used merely as loose settings into which the patient localized the images that passed through his mind. Whenever he could be induced to tell about his reveries he related them as real events, but as events that took place in a phantastic world, somewhere far away.

The striking feature about the phantasies of the patient is that he seems to take them for reality, as he does pictures, movies, and stories. This, however, is not always the case. In looking at pictures, e.g., Lanuti often spoke of them as such, asking who made the picture, or who cut the picture (puzzle) into pieces. We also found that when combing his hair he used the mirror adequately (p. 8). Assuming from this evidence that Lanuti was able to appreciate reality as such, we suspected a playful joking attitude behind his peculiar behavior, and on several occasions tried to make him admit that the animal with whom he tried to converse was merely a picture, that dogs do not talk anyway, or that the noise he ascribed to the train in a picture was actually produced by himself. Lanuti's reaction to these propositions showed clearly that he was not 'pretending', but actually unable to distinguish between reality and phantasy. He would first defend his perception, saying, e.g., in response to the observer's representation that the dog was merely on paper: "No paper, see, eyes open, looking at me all time", or: "Yes, dog talk, he say wow!" If the observers did not accept these retorts and earnestly insisted that the patient acknowledge reality as they saw it, he would either become disturbed and shout his assertions wildly, staring at the

observers with a frightened expression, or would become extremely puzzled and depressed. Obviously, by asking Lanuti to differentiate between reality and phantasy we were placing him before a task he was unable to solve. Just as in the recognition of objects, different clues at different times determined the patient's perception. According to the momentarily predominant interest, he either saw the object as a picture or became completely absorbed in its content. He was unable, however, to have both conceptions at the same time, and to judge the one in the light of the other.

A normal adult, in distinguishing between phantasy and reality, applies certain criteria to his experiences: the events must conform to the laws of nature, must have a certain position and continuity within temporal and spatial frames of reference, in order to be judged as real. The patient, however, is unable to do so, because he possesses no constant criteria or frames of reference. Consequently we cannot even say that he takes his phantasies for reality: in order to judge events as real one must be also aware of what is unreal, or phantastic. The experiences of the patient do not fall into separate realms of reality and phantasy, as do ours: they are not real or unreal, but simply are there. This does not imply that the real and the imagined situations are not somewhat different for the patient. The fact that he frequently referred his phantasy images to the night time, or to such distant places as the North Pole, seems to indicate that these images lack the insistency and vividness of actual perceptions. But Lanuti was completely unable to go beyond this vague feeling and to differentiate explicitly the two kinds of situations.

We shall discuss at this point a phenomenon that seems to be related to the problem of reality and phantasy, namely the patient's animistic or physiognomic, perception of the world (45). On frequent occasions he seemed to ascribe independent existence and life to parts of his own body and to inanimate objects. Once, bothered apparently by the buzzing in his ear he swore energetically at somebody who "made noise inside", and boxed his own ear soundly. When reprimanded for it he remonstrated, saying that it had helped: the "fellow" did stop the noise. When the joints of his fingers cracked they were treated in a similar fashion. When a chair creaked under him he jumped up as if frightened, looked at the chair with puzzlement and distrust and retired into a distant corner, muttering something about "diavolo". A similar response was made to the window shade that flew up when touched, to the electric bulb at the ceiling which lit when a button was pressed, and even to the small pieces of cardboard which flew off when he snipped them with scissors. Sometimes he would look at the jumping pieces, shaking his head in amazement; at other times he seemed to take their behavior for granted, and picking them up from the floor would admonish them, saying: "No go away!" or "Come back." When shown a toy penguin which walked when placed on an inclined plane, he backed away from this sight and hid himself behind a bookshelf answering the observers' remark that it was merely a toy: "No, he walk. Man like that come to me at night." It would seem that the apparently spontaneous movement and the production of sounds were the main characteristics that led the patient to consider objects as being alive. Occasionally, however, stationary objects were spoken of in a similar way, as when the form board pieces, after being placed in the

form-board, were told to "sleep there" by the patient.

In attempting to explain these phenomena, we must note that they usually occurred when the patient was confronted with a sudden, unexpected event which disrupted his momentary occupation. For a normal person the creaking of a chair when one sits down on it, or the flying up of a window shade, is not particularly unexpected or disturbing, but for the patient, whose situation is extremely narrowed down, such an event assumes major proportions: it disrupts his momentary world and produces bewilderment and fear. It is likely that the element of suddenness played an important part in the reactions of extreme terror occasionally produced in the patient by explosive noises, the lighting of a match, or a playful attack by a dog.

Even when the unexpected event is not quite so drastic and threatening, it must be dealt with by the patient somehow, it must be explained. This explanation must be concrete, and the most concrete way of seeing an event is to see it as somebody's action. Our own actions and the changes they produce are experienced in a most immediate personal fashion. Any mechanical explanation of an event is abstract by comparison, and represents a later stage in the development of thinking (33). Since our patient lacks explicit understanding even of the simplest spatial and mechanical relations, he must give animistic explanations to a wide range of phenomena, and like young children, tends to consider as alive all objects that seem to display spontaneity. The tendency to model all explanations on his own familiar actions may account also for the anthropomorphic elements in his perception of the world.

There remains one further point to be considered. How whole-hearted are the animistic interpretations given by the patient? Does he actually consider the walking toy, the creaking chair, the flying paper as being alive, like human beings and animals? In some instances this seems to be the case: the casual remarks of the patient indicate that he takes the animate nature of an object simply for granted. More often, however, the animistic interpretations seem to be lacking in conviction. In giving such an interpretation, the patient is following one clue—the movement, the apparent spontaneity of the object. We may assume, however, that other aspects of the object which are not consistent with this interpretation, do not disappear altogether, but are present in the background. Thus a complete acceptance of the images seen in the mirror is undermined by a sudden disappearance of the whole scene when the mirror is removed, which leads the patient to exclaim: "Che diavolo, people around, no more; room gone". Or when the cardboard being cut suddenly becomes alive and jumps from under the scissors, the fact that a moment ago it behaved as inanimate, may prevent a complete 'clicking' of the animistic perception. Such conflicting experiences probably account for the emotional coloring of the animistic interpretations, which is different from a simple fear response to sudden frightening events, and is best described as a feeling of uncanniness. The unexpectedly active objects are frequently referred to as "diavolo", or are placed into the same vague sphere of 'not really here' as Lanuti's dreams and daydreams: the walking penguin, e.g., is the man who "comes to me at night". The patient's attitude reminds one of that of a child who treats his doll as if it were alive, yet would certainly become frightened if the doll should actually start moving. Both the child and the patient do not consciously

apply criteria permitting a distinction between reality and phantasy, or between animate and inanimate objects. Nevertheless, they constantly have experiences out of which such criteria might be formed, and each event that goes against such recurring observations of the behavior of objects, is felt as peculiar and weird.

Thus we find that the characteristic defects of the patient—his dependence on and complete absorption in the momentary action-situation, his inability to form stable frames of reference and to apply actively any categories to his experiences—produce a picture of the world strikingly different from ours. Lanuti's world not only lacks organization in space, as well as differentiation between the present and the past: the events in this world lack also subjective and objective reference which provides a basis for a normal person's conception of reality as apart from the subjective world of phantasy. As a result the patient is unable to distinguish the products of his abundant phantasy—in spite of their somewhat different 'feel'—from the world of reality. He lives in an undifferentiated world in which the question: real or imagined—has no meaning and does not arise spontaneously. No less marked is the lack of differentiation between such all-important classes of objects as animate and inanimate. In spite of certain misgivings, the patient often perceives objects that show an unexpected spontaneity as active and alive, thus displaying an extremely primitive animistic perception of the world.

IX. The Course of Development

The results that have been reported in this study are based largely on observations and tests conducted during one year of intensive study which was started ten months after the patient's accident and three months after his admission to the hospital. During the second year of the study the patient was seen at less frequent intervals, approximately once a month. After that, for a number of years, the observers saw the patient only once a year, and did not work with him intensively. At the end of the ninth year a more extensive check-up was made. The observers worked with the patient for a few days, testing a selection of performances that had been previously investigated in detail. We shall now compare the initial state of the patient with his state after nine years of hospitalization, with regard to clinical picture, hospital status, tests' results and general attitudes of the patient.

During the nine years of hospitalization Lanuti showed no major changes or fluctuations in his behavior, except for occasional increases in motor restlessness. One period of marked motor excitement occurred in the second half of the first year, necessitating the administration of sedatives for about two months. Many of the psychological tests had to be discontinued at that time, because the patient, instead of concentrating on his task, played with the test objects and threw them around. This period was marked also by acute hallucinations and by an intensive acting out of day-dreams and phantasies. The hospital records do not show whether there were other periods of motor excitement during the later years, when the patient was not under close observation.

During his first year in the hospital the patient was put to work and soon afterwards given parole; from then on he enjoyed the reputation of being a good and willing worker. However, the quality of his work was not noted to improve markedly, and he was never given any but the simplest farm work. The greatest change in the status of the patient took place with regard to his contacts with his family. During the first years in the hospital, although visited regularly by his family who lived nearby, he was seldom taken home for visits. Gradually the frequency and length of these visits increased, until finally, in the ninth year, he went home for one and two weeks, and then repeatedly for visits of a month's duration. However, judging from relatives' reports and from direct observations made in his home, Lanuti's behavior there was not basically different from his behavior in the hospital. While helping with some simple work, such as shovelling snow, and not creating any great disturbances, Lanuti did not participate in the life of the family, did not display initiative in social contacts or any understanding of what was going on, and had to be directed and taken care of much in the same way as he was in the hospital. The change in the amount of family contacts was due not to the improved state of the patient, but to the fact that the attitude of the family changed in the course of years, making it possible for them to accept Lanuti in his new inferior status (cp. p. 55). The insistence of the Social Service of the hospital on more frequent and prolonged home visits also played a part in this development.

We shall now briefly review the results of the tests given during the final

check-up for evidence of possible changes in the patient's performances. During these sessions Lanuti was in a quiet mood and paid good attention to the tests. The validity of the results, however, is necessarily limited by the shortness of the examinations.

The patient experienced the same difficulties in recognizing objects, persons, pictures, shapes and colors. Single clues still determined his interpretations: thus a woman was identified as a boy because of her short hair. Correct recognition was occasionally achieved if the object could be brought to function. The task of sorting was performed better than formerly (cp. p. 16): Lanuti showed no catastrophic reaction to the examiner's request to select all red colors corresponding to the red sample, and quickly picked out all saturated nuances of red, putting them in a row. However, after that he added brown and orange to the same group. Similarly with blue, he first selected all saturated blue nuances, then continued the series with green and even yellow.

Spatial organization presented essentially the same difficulties as before. Although Lanuti was rather successful in reconstructing simple structures out of blocks and copying simple patterns, he frequently missed the finer details, and occasionally made gross errors. The tendency to round the angles was obvious, as well as the tendency to make block structures more symmetrical than the model. The simplest picture puzzles were solved only after many trials. Motor performances implying spatial construction, such as shaving, tying his tie or his shoes, were still out of his reach. He still had to find and count his eyes, ears and legs before he could tell how many he had. Orientation in the environment was not tested, but his family reported that they could not depend on him to go alone to the hospital or to come home by himself from a neighbor's.

The use of language seems to have remained at the same level. Lanuti talked freely in his broken English when giving expression to the concrete situations he found himself in. In listening to stories consisting of a few sentences he was relatively calm (cp. pp. 35-36), and when requested to repeat them, made an obvious effort to do so. Yet he had difficulties in understanding even the simplest episodes, and obviously took the stories for reports of real events, often declaring that he had seen the person or the event described. He was unable to read words, and of the printed letters only O was named correctly. His signature was poorer than before, having shrunk to three letters. (His name actually contains nine letters.) Counting was as defective as before and showed the same peculiarities: only in the manifolds containing up to three items were the numbers directly recognized by the patient. In memory tests he displayed the same forgetting of what he had done a few minutes earlier, and the stories he tried to repeat frequently ended in confabulations. He was unable to reproduce past events at will, except when the examiner's question happened to actualize a past situation, which was then recalled very vividly.

The emotional reactions and valuations—the fear of fire, the rejection of useless objects and of aggressive actions, the joy over successes, the strong response to friendliness—were essentially the same as before, but seemed to be less extreme. Clear differentiation between reality and fiction or phantasy was missing, the patient occasionally responding to pictures as if objects depicted were real, and making many phantastic statements.

In summary, we can say that the general level of the patient's performance remained basically the same over a period of nine years. Some performances, such as writing his name, became poorer, possibly due to lack of practice; other tasks like sorting and some of the constructive activities were performed a little better than before, possibly due to the patient's quiet mood and good attention at the time of the re-tests. In spite of these favorable conditions we did not find a single performance that had improved basically in the course of the years—there was no deterioration, but the original defects were evident in all fields of activity.

These results are not quite in line with the findings of other follow-up studies of brain-injured subjects. One finds occasionally a much greater progress in general adjustment, a successful dealing with complex tasks which, at first, were outside of the patient's scope (27). The detailed investigations of some of these cases revealed that the progress was due not so much to the restitution of the damaged psychological functions, as to the patient's having found new methods and round-about ways to solve the tasks in question. With our patient we found very few such round-about ways, and consequently very little improvement of performance. Attempts at new methods of attack were not altogether missing: we described, e.g., how Lanuti, in the earlier period of his illness, had attempted to insure the recognition of places, shapes, pieces of picture puzzles, by attaching certain clues to them. These methods, however, were inefficient and soon were dropped by the patient. We found no traces of them on the re-tests. The reason for this paucity of adequate new methods of dealing with the tasks that could no longer be performed in the normal fashion may lie in the severity and generality of the patient's defect, or in his low intellectual and educational equipment, or in both. Lanuti's background provided him with few means and techniques for substitute solutions whereas the severity and extension of the defect made all compensations and circumventions difficult. In addition, it is possible that the round-about ways attempted in the beginning did not become further developed and stabilized, because the tests did not have any practical importance for the patient. It is well to note that in one field at least—namely in finding his way on the hospital grounds, an activity that had vital importance for the patient—his performance did improve with time, probably due to the stabilization of a series of clues.

If the performance of the patient remained basically the same, his attitude towards performance and achievement underwent a certain change. This change seems to have taken place even during the first year of hospitalization. At the beginning, when faced with a difficult task, Lanuti very seldom produced phantastic solutions; he showed a strong emotional reaction to failures and to suspected false solutions, ranging from excitement and fear to a deep depression. As time went on these reactions subsided and the patient started slipping into phantastic and playful solutions when confronted with difficult tasks (cp. pp. 20, 38, 51). When this trend first appeared, it seemed to be quite strong; some of the more difficult tests, such as arithmetical problems, had to be discontinued, because Lanuti put forth no effort and seemed to be satisfied with any solution. At the same time daydreaming and confabulations were strongly on the increase. The patient

seemed about to withdraw completely into the world of his phantasy. Further development, however, did not bear out these impressions. It is conceivable that the trend away from reality appeared stronger than it was, because it was temporarily reinforced by the occurrence of the period of motor excitement with its accompanying restlessness and inattention.

Whatever the reason, the withdrawal from reality that set in during the first year did not progress very far, nor did it spread to all types of performance, and a certain stabilization was reached. It seems plausible to assume that at the beginning of his disease the patient still had normal expectations of achievement with regard to familiar activities, such as reading and counting. He eagerly attacked such tasks, and was deeply shocked and discouraged by his failures. Gradually he gave up all attempts at earnest solutions and protected himself against failures by resorting to phantastic or random solutions. He was still ready, however, to attack the tasks in which he was able to succeed at least partially or occasionally.

During the check-up the patient displayed good effort and showed a certain concern about his performance. Correct solutions were presented with an expression of conviction and satisfaction which was lacking in the wrong solutions. Obviously the experience of 'clicking', of complete fulfilment, in the moment of contact with reality, was still present in the patient. But all these experiences seemed to be less acute than nine years ago: he did not display the same exuberance at the moment of a contact, nor the same disturbance or depression at failures. In spite of good effort and attention, the drive for correct solution and for the mastery of the problem seemed less than the maximum reached before. Thus in the past when confronted with the picture puzzles the patient would not rest until he had reached the correct solution; now, although not altogether happy about a wrong solution, he did not try to change it, unless told to do so by the examiner. Furthermore, during his first encounters with picture puzzles and form-boards, the patient was not always satisfied with a chance correct solution, but would try to master the method of correct solution by repeating his performance over and over again. No traces of this behavior were noticed during the check-up.

To summarize: No outstanding changes in performance—neither improvement nor deterioration—took place during the patient's nine years of hospitalization. Performances on tests in different fields were approximately the same at the beginning and at the end of this period. In practical situations of everyday life a certain limited adjustment to concrete, ever-recurring situations of the hospital and of the home took place, which did not include any basic changes in behavior. The fact that so few round-about methods of solving tasks were used, may be due to the severity of the defect and the originally low intellectual equipment of the patient. Change of attitude is perhaps the more important component of the patient's adjustment. It implies a certain loss of expectation of achievement in the most difficult tasks, and a relative withdrawal from such tasks into the realm of phantasy. Through this withdrawal the patient, while still retaining the possibility of contact with people and tasks, obtained a certain protection from the worst shocks of failure. Possibly because of this change the patient now appears somewhat less emotional and expressive, but also more calm and stable in mood, and better adjusted to his environment.

X. Summary

A detailed psychological analysis is presented of a case of mental deterioration subsequent to brain damage by head injury. The investigation which extended over a period of nine years, was carried out by means of observations and numerous special tests. The study yielded material on the patient's perception and recognition of objects, his use of symbols, memory, emotion, and imagination, as well as on his general adjustment to his defect. Because this material is so rich in detail, the contents of the study cannot be presented very adequately in a brief summary. Detailed summaries have been given at the end of chapters dealing with various fields of performance.

Agnostic symptoms were among the outstanding phenomena revealed by the investigation. However, they were not present uniformly under all conditions. Objects were recognized more or less adequately, according to how closely they were connected with an action-situation. Thus real objects which were immediately put into action by the patient were recognized correctly more frequently than pictured objects; objects offered in a setting permitting an action (knife with bread) were recognized better than those presented in isolation; pictures representing people in action were responded to more readily than those representing objects, whereas the recognition of colors, which have no specific connection with any action or use, proved especially difficult. The tendency to action was so strong in the patient that even pictured situations were acted out by him; however his recognition carried subjective conviction only in case of real objects which functioned adequately when put into action. The task of classifying objects which requires a detached categorial attitude rather than realistic action was never adequately carried out by the patient.

In trying to orient himself in his surroundings, or with regard to his own body, the patient lacked a spatial schema, and his behavior was directed only by single specific clues. He depended on these clues in finding his way in the hospital, trying, e.g., to identify his room by counting the windows, and his bed by a ribbon tied around the post. In tasks requiring spatial construction he lacked the appreciation of the relative positions in which parts had to be placed to produce the desired whole, and consequently was unable to solve even the simplest picture puzzles. All motor performances requiring a certain amount of spatial analysis, such as tying a tie, or untying of a knot, were beyond the patient's capacity.

Language behavior of the patient presented a particularly interesting picture. The use and understanding of words as such was not markedly impaired: the patient used his limited English vocabulary freely in communicating his experiences and in expressing his emotions and understood simple directions well enough. Yet he was completely unable to understand any statement that had no basis in the immediate momentary situation. He was even incapable of understanding a simple short story, and taking it for a report of real happenings, would look around with puzzlement for the people and objects mentioned in it. Thus his understanding and use of language was fully as much dependent on situational support as was his recognition of objects. Similar conditions prevailed in his appreciation of numbers.

The use of symbols as a means of operating at will with non-present things or with abstractions was completely closed to the patient.

In the field of memory the patient would occasionally vividly re-enact some past experience, but this happened only if something in the present situation evoked a past one. This effect could not be achieved by isolated questions directed at him; the patient was quite incapable of reproducing knowledge at will, even when the question referred to an occurrence that had taken place a few minutes ago. The events that were recalled were not localized in time by the patient, and seemed to have hardly any coloring of the past. Under certain conditions the patient was able to relive several concrete episodes of his life, both recent and distant in time, but he had no continuous picture of his own personal past.

The valuative, emotional responses of the patient to people and happenings were unusually strong and vivid, but they were evoked only by simple concrete situations, such as his momentary successes and failures, adequate functioning or pleasing appearance of objects, or friendly expressions and actions of other people. Yet these single emotional responses of the patient were never consolidated into a constant attitude independent of the momentary presence and action of the other person, and consequently no permanent emotional bonds could be formed by the patient. This was true even with regard to the members of his own family.

Most spectacular was the patient's inability to distinguish the world of reality from that of phantasy or fiction: he would often address pictures or inanimate objects as if they were alive, and, in speaking about his dreams and day-dreams he treated them as if they were occurrences in real life.

This survey of the deviations from the norm in the various fields of performance reveals a consistent pattern which is common to all of them, and which has not changed essentially during the nine years of the patient's hospitalization. The patient functions well if the task can be solved on a concrete level; he is successful in performances concerning action-situations. Any task that requires detachment from the momentary situation, thinking in categories, spontaneity, initiation of action at will, shifting voluntarily, is outside of the scope of the patient. In some of these respects his behavior shows similarities to that of children and so-called primitive peoples; however, it reveals also essential differences. We are not dealing here with regression to a child's level but with extreme de-differentiation of an adult individual.

Being limited to momentary action the patient is incapable of forming and maintaining stable frames of reference which insure continuity and order of experience and behavior in normal people. As a result of this lack he lives in a world that has hardly any organization in space, is not differentiated into past, present and future, and even lacks differentiation into subjective experience and objective reality. He presents, in an extreme degree, the picture of concreteness of behavior which Goldstein considers characteristic for organic deterioration, and a striking demonstration of what a mature human organism is like when it is deprived of the functions that may be considered unique human beings.

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